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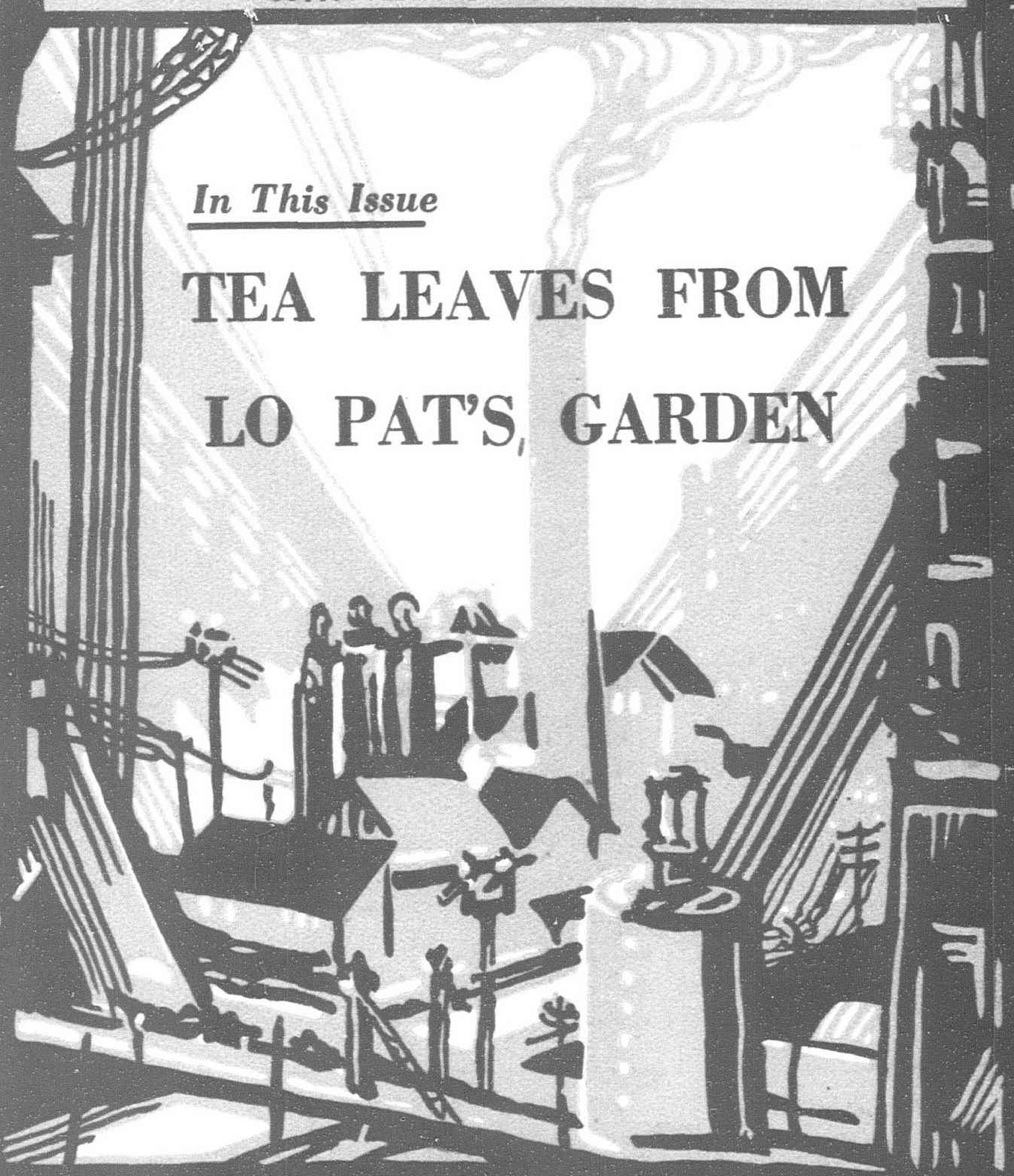

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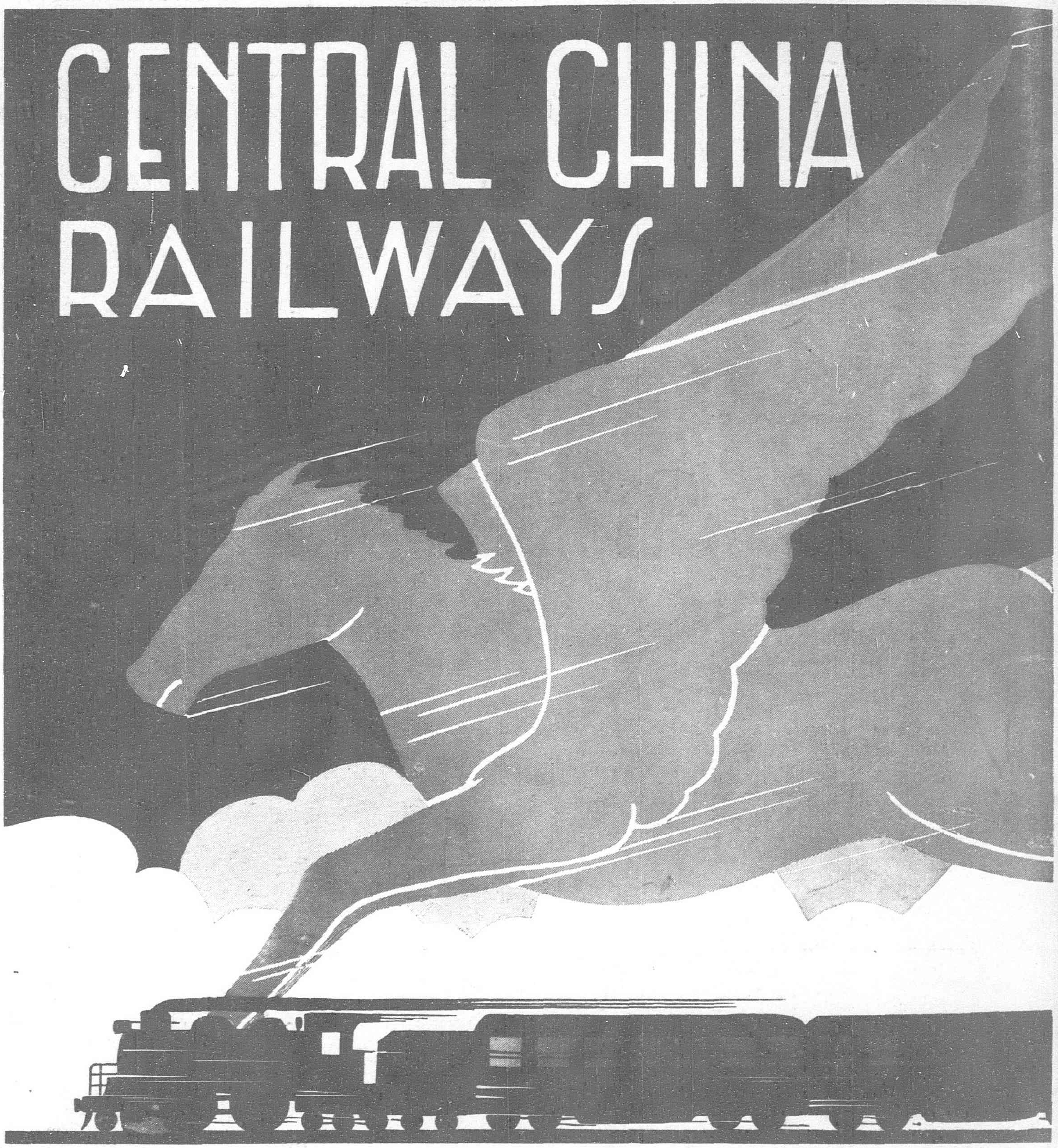

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The Far Eastern Review
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FAR EASTERN CROSS-CURRENTS

It is becoming increasingly clear in my opinion that American interests, as well as those of Great Britain, lie in reaching a friendly understanding with Japan. This is the opinion given by Rear-Admiral Yates Stirling, U.S. Navy, Retired, in an article published this month by The United Press. The writer continues as follows:

Japan so far is following a policy of "non-belligerence" towards the European war, but there are indications she may be leaning towards collaboration with the Axis Powers. Obviously that collaboration is not in the interest of the British or ourselves.

The question is not one of "appeasing" the Japanese. It is one of looking facts in the face. The Japanese Foreign Minister, in his address to the world, stated the situation which we face. He asserted that Japan is the dominant power in East Asia and indicated that the empire shares the view of the Axis Powers that a new world order must be created in which the great military Powers in the chief geographical divisions of the world will dominate the smaller nations within their spheres.

The plan, as I understand it, is that Japan intends to become, as indeed she already is, the dominant Power in East Asia and contiguous areas of the Pacific Ocean. This part of the world, if the Japanese can make good in their far reaching plans, would be reorganized economically and to some extent, politically and militarily, so that it would constitute a unified whole of co-operating peoples. Japan would be the great armed Power which would prevent encroachments by other great Powers and would make East Asia a region primarily for Asiatics.

If one looks at a map it is apparent that the Japanese plan involves changes in the whole strategic and economic set-up which has prevailed in East Asia for more than a century. It means that British and French power in East Asia must be broken and that our own rôle in this part of the world, if peace is to be maintained, must be limited largely to fields in which we will not "challenge" the Japanese.

For the British and French, the immediate problem is more serious than it is for us. Britain's naval station at Hongkong already is menaced by Japanese forces, the British concession in Tientsin has been rendered impotent. Japanese inspectors are stationed in French Indo-China and the Japanese are exercising increasing control on the French Concession at Shanghai.

The Japanese have obtained concessions from the Netherlands East Indies and are demanding more, including a larger share of the trade of these rich inlands.

Throughout the whole area they have chosen for themselves, the Japanese are on the move. History would indicate they can be stopped only by superior military force. And there is no Power now which can divert its force to this region.

We have been forced by the developments in Europe to disperse our naval power. British, French and Dutch strength in the Orient is negligible.

The problem, as I see it, is to prevent Japan from adopting a policy of complete co-operation with the Axis powers. This can be done only by convincing Tokyo that Japanese interests in the long range view lie in co-operation with the United States and with Britain.

The great bulk of Japan's trade outside her own immediate sphere always has been with us and the British Empire. These economic interchanges are largely reciprocal and non-competitive. Strategically, the Japanese position never will be secure in East Asia as long as we are a potential enemy. We have the resources to build a greater navy than Japan ever can hope to build. In the present expansion of armaments the Japanese are bound to fall behind very rapidly as soon as we hit our stride.

The first move the British and French need to make, in my opinion, is to recognize that their possessions in East Asia cannot be defended.

Once that is done a risk of Japan's involvement in the war will have been averted. A first step might be for the British and French to agree that they are ready to give up their possessions in China proper, including Hongkong.

China long has demanded a return of these areas and the announcement that they will be returned as soon as satisfactory conditions can be arranged probably would do much to remove the immediate danger of a possible Japanese invasion.

For our part, we should begin negotiation for a new basic treaty with Japan to replace the agreement terminated by us last January and should try generally to normalize Japanese-American relations.

There is every indication that we may need all our strength, naval and otherwise, to face the threat that may come from Europe if Germany's operations against Great Britain end in success. It would seem but the part of wisdom to assure the safety of our Pacific flank if we can do so with honor.

"To Dispel Clouds"

Japan still desires to readjust her relations with the United States so as to dispel "clouds now hanging over relations between the two countries," the Japanese Foreign Office spokesman, Mr. Y. Suma, told the press here on July 12.

Mr. Suma, replying to a question, said that Japan's desires have been known to the United States since last summer when the United States abrogated the Japanese-American trade treaty of 1911.

At that time, Mr. Suma said, "our cards were placed on the table." He said Japan expressed her desire then for a readjustment of relations and the conclusion of a new trade treaty.

Mr. Suma told the press, however, that no Japanese-American talks were under way here at present to improve Japanese-American relations.

The Monroe Doctrine

President Roosevelt asserted on July 6, that the United States would welcome any true application in other parts of the world of principles similar to the Monroe Doctrine as practiced by the United States in the Western Hemisphere.

The President disclaimed any intention on the part of the United States to interfere in territorial questions involved in readjustments in Europe and Asia, but he made it clear that the United States believes all countries concerned in such readjustments should have a free and equal voice therein.

The President's statement was released in New York where the President was spending a weekend at his country home, by Mr. Stephen Early, White House secretary. It follows an amplification of the Monroe Doctrine by Secretary of State Cordell Hull, who said, "It never resembled and does not resemble policies which appear to be arising in other geographical areas of the world which are alleged to be similar to the Monroe Doctrine."

President Roosevelt's statement follows in part:

"There is a complete absence of any intention on the part of the United States to interfere with territorial questions involved in readjustments in Europe and Asia. . . . The United States Government wants to see and thinks there should be application of a Monroe Doctrine in Europe and Asia similar to the interpretation and application of those principles in this hemisphere . . . .

"The United States will not take for itself any islands or other possessions hitherto held by any conquered nation. However, the United States sincerely believes and maintains that the administration or disposition of such possessions should be and is properly a question to be decided by and among all republics of the hemisphere and not by the United States alone."

In explanation of President Roosevelt's reference to Monroe Doctrines in other parts of the world, Mr. Early said that in the case of French Indo-China, for example, the United States believes that all Asiatic countries should confer and decide its ultimate disposition, should a change become necessary, and that the same procedure should be followed in Europe and elsewhere.

New Tokyo Government

The six-month-old Yonai Ministry resigned *en bloc* on July 16, after having struck a snag in the form of a new national political structure which, as advocated by Prince Ayamaro Konoye and others, has been envisaged and advocated as a means of pulling Japan through her current emergency period.

The outgoing Cabinet, has been credited with a number of administrative successes including a settlement of the rice question and the adoption of a low-price policy. A series of diplomatic successes also have been scored by the Yonai Ministry.

Prince Fumimaro Konoye on July 17 accepted the Imperial order appointing him Premier and charging him with the task of forming a new Government. He immediately started selecting his ministers.

The former Premier and leader of the one-party movement was summoned to the Imperial Palace at 7.20 p.m., shortly after the return of Emperor Hirohito from Hayama. Emperor Hirohito personally ordered Prince Konoye to form a new Cabinet.

Prince Konoye formally accepted the order. Immediately after leaving the Imperial Palace, he summoned his colleagues for the purpose of forming a new Cabinet which would adopt a stronger foreign policy, strengthen the domestic system and accelerate the China campaign.

The selection of Prince Konoye as the new Premier presaged a Government which would closely co-operate with the Army and under a unified party system, political quarters said.

They saw the possibility of a stronger foreign policy with an Axis tinge, but believed that the Government would restrain any excessive extremisms.

Decision to choose Lieut.-General Hideki Tojo, Inspector-General for Military Aviation, as War Minister was reached at a session of the Army's "Big Three" participated in by Field-Marshal Prince Kotohito Kanin, Chief of the Army General Staff; General Shunroku Hata, outgoing War Minister, and Lieut.-General Otozo Yamada, Inspector-General of Military Education.

Navy leaders, in an emergency meeting decided that the Navy Minister of the outgoing Government, Vice-Admiral Zengo Yoshida, should remain at his post.

The Foreign Minister-designate in the new régime will be Mr. Yosuke Matsuoka, former President of the South Manchuria Railway, and one-time chief Japanese delegate to the League of Nations, it was decided.

"I did not have much talk with Prince Konoye who has everything well planned in his mind. I am tired of talking. From now on my motto will be 'Action before words,'" declared Mr. Yosuke Matsuoka, when interviewed by pressmen after his visit to the Premier-designate at Prince Ayamaro Konoye's Ogikubo residence.

Mr. Matsuoka became internationally known for his remarkable presentation of Japan's case before the League of Nations as the chief Japanese delegate at Geneva during the historic session in 1932 when Japan seceded from the League in protest against the adoption by the Assembly of the report by the Lytton Commission on Manchurian affairs.

Mr. Matsuoka is a self-made man. Born in Yamaguchi Prefecture in 1880, he went to the United States when he was 14 years of age. He worked his way through high school and the Oregon State University and returned to Japan nine years later. For two years he studied for the diplomatic service, passing his examinations and serving for 17 years, beginning as Japanese Consul in Shanghai and rising to be spokesman at the Foreign Office in Tokyo.

During his early years in America, Mr. Matsuoka gained his excellent command of English and once in jest told friends that when he talked in his sleep, he did it in English. Following his return from Geneva, Mr. Matsuoka marked himself as among the first to advocate the dissolution of all political parties and to prove his sincerity, resigned his seat in the Diet.

In 1935 he was appointed President of the South Manchuria Railway Company and remained in the service of that company until April last year. He has also served as a Cabinet Councillor.

Burma Road Closed

Great Britain's desire to see China's integrity preserved and Japan attain a state of prosperity, was reiterated by Mr. Winston Churchill, the Prime Minister, when he made a statement on the agreement with Japan concerning the stoppage of war materials to China via Hongkong and Burma, in the House of Commons on July 16.

In concluding the agreement, he said, the British Government had taken into consideration its obligations towards China. However, they could not ignore the fact that the Empire was now fighing for its existence.

Stressing that the present agreement was a temporary arrangement, Mr. Churchill expressed the hope that in the time so gained a settlement of the Sino-Japanese dispute would be effected. After a solution of the conflict, Britain was ready to take up with China problems affecting concessions, extrality rights and treaties.

Giving a review of the negotiations with the Japanese Government, the Prime Minister declared: "On June 24, the Japanese Government requested His Majesty's Government to take measures to stop the transit to China via Burma of war materials and certain other goods; a similar request was made in respect of Hongkong.

"Continuance of transit of these materials was represented as having a serious effect on Anglo-Japanese relations. An agreement has now been reached with the Japanese Government, as follows:

"(Hongkong) Export of arms and ammunition from Hongkong has been prohibited since January, 1939, and none of the war materials to which the Japanese Government attach importance are, in fact, being exported.

"(Burma) The Government of Burma have agreed to suspend, for a period of three months, the transit to China of arms and ammunition, as well as the following articles: petrol, lorries and railway material. The categories of goods prohibited in Burma will be prohibited in Hongkong.

"In considering the request made by the Japanese Government and in reaching the agreement to which I have referred, the Government were not unmindful of the various obligations accepted by this country, including their obligations to the National Government of China, and to the British territories affected.

"His Majesty's Government were, however, also bound to have regard to the present world situation nor could they ignore the dominant fact that we are ourselves engaged in a life and death struggle.

"The general policy of this country toward Far Eastern troubles has been repeatedly defined. We have persistently asserted our desire to see assured to China a free and independent future, and we have frequently expresed our desire to improve our relations with Japan. To achieve these objectives, two things are essential—time and a release of tension.

U.S. Displeased

Reflecting United States anxiety over the closure of the Burma Road, which is the only remaining route whereby American goods can enter Free China, the Department of State announced that it was opposed to the closing of world arteries, such as the Burma Road and the French Indo-China railway.

At the same time the Secretary of State, Mr. Cordell Hull, in reply to enquiries by press correspondents for comments in regard to reports that, at the instance of the Japanese Government, the British Government would prohibit temporarily the movement of certain commodities through Burma into China across what is known as the Burma route, said "the Government of the United States has a legitimate interest in keeping open arteries of commerce in every part of the world, and considers that action such as this if taken, and such as was taken recently in relation to the Indo-China railway, would constitute unwarranted interpositions of obstacles to world trade."

Although it is clear from Mr. Cordell Hull's statement that the United States Government is much concerned over the closure of the Burma Road, there is little indication that the United States is willing to do much, if anything, to restrain Japanese ambitions, which is now attempting to force Britain to participate in the blockade of China.

It is true that the United States Fleet remains at Hawaii, but political observers believe that the possibility of any action, such as an embargo on scrap metal or petrol, even in the name of American defence measures, is now rather remote.

"No Concern of U.S."

"It is uncalled-for intervention in the wrong place" and would not affect Japan's policy, commented the spokesman of the Japanese Navy Office on the statement by Mr. Cordell Hull attacking the Anglo-Japanese and Franco-Japanese agreements for stopping the supply routes through Burma and French Indo-China to Chungking.

At a press conference the Navy spokesman pointed out that Japan, in pursuance of her strategic requirements, had requested Great Britain and France to suspend the transportation of war materials assisting the Chiang Kai-shek régime via those routes and both Great Britain and France complied with the Japanese request.

"The United States," the spokesman added, "has nothing to do in the matter as a Third Power." To the question of an American correspondent as to whether Japan's policy would be affected as the result of Mr. Hull's statement, the spokesman replied in the negative.

Japan, the spokesman added, is going ahead with her undertaking for the disposal of the China Affair in accordance with her fixed policy and therefore her policy would not be affected by a mere verbal gesture from any third party.

Asked whether the Anglo-Japanese agreement on the Burma route question was satisfactory, the spokesmen replied, "Not extremely satisfactory."

There was possibly not much traffic along the Burma route in the coming three months, he observed, but when the dry season comes with the traffic in goods becoming brisk, the spokesman hoped that the suspension of war materials along the Burma route would be further tightened.

Policy Change Seen

Government circles at Washington, believe that the United States Far East policy has entered a more active phase as a result of the announcement by Mr. Cordell Hull, Secretary of State, that United States disapproves the closing of the Burma Road.

President Roosevelt at his press conference declined to comment on Mr. Hull's announcement.

He declined to say whether Mr. Hull's statement constituted a clash with Britain.

Informed political quarters and Government officials, however, said that President Roosevelt was motivated by the desire to permit Mr. Hull, to take undivided leadership of the United States' Far Eastern diplomacy.

President Roosevelt's refusal to comment on the announcement, they said, also indicated that it was the official view of the Government that the Burma Road matter was completely within the diplomatic field and had not yet become a subject for a broad national policy requiring presidential affirmation as in the European situation.

Government officials pointed out as significant the fact that the United States fleet remained in the Pacific despite appeals that naval units be recalled to the Atlantic.

The United States, they emphasized, is apparently determined to play an active rôle in Far Eastern developments, especially in view of the uncertainty resulting from the Japanese Cabinet change.

Mr. Hull, they added, appeared to believe that the United States retains a powerful voice in the Far East and requires consideration in any Japanese move to force Britain to take action prejudicial to "World trade."

Arita Envisages New World

A redivision of the world's territories into natural spheres of common interest and influence, with each nation solidly established in its natural position in its own region was suggested as the way toward international peace in a radio broadcast on June 29 by Foreign Minister Hachiro Arita.

The Foreign Minister's radio speech came in lieu of a formal statement which had been expected on previously reported changes in the Japanese Government's foreign policy. However, there is little in the English text of Mr. Arita's speech as issued by the information bureau of the Foreign Office that suggests noticeable diversion from the international path Japan has followed since the outbreak of the China incident.

The English translation of the Foreign Minister's speech issued by the Foreign Office follows:

"Japan's ideal since the foundation of the Empire has been that all nations should be enabled to find their proper places in the world. Our foreign policy has also been based upon this ideal, for which we have not hesitated at times even to fight by staking our national existence.

"What all mankind longs for is the firm establishment of world peace. But it goes without saying that peace can never endure unless it is a peace in which all nations enjoy their proper places. Unfortunately, however, the establishment of world peace in this sense is difficult of speedy realization at the present stage of human progress. In order to realize such a great ideal, therefore, it seems to be a most natural step that peoples who are closely related with each other geographically, racially, culturally and economically should first form a sphere of their own for co-existence and co-prosperity and establish peace and order within that sphere, and at the same time secure a relationship of common existence and prosperity with other spheres.

"The cause of the strife mankind has hitherto experienced lies generally in the failure to give due consideration to the necessity of some such natural and constructive world order and to remedy the irrationalities and injustices of old. The war in Europe brings home the truth of this with special emphasis. Therefore, in order to establish international peace on a permanent foundation every effort must be exerted for the rectification of the blunders that have been committed in this regard.

"It is in this spirit that Japan is now engaged in the task of establishing a new order in East Asia. It is extremely regrettable, therefore, that there should be those who not only fail to understand Japan's great undertaking based upon this fundamental principle, but on the contrary, obstruct the establishment of peace in East Asia by supporting the régime of Chiang Kai-shek. We have urged them to reconsider such an attitude in the past, and now we intend further to urge their serious reflection. We are determined to leave no stone unturned in order to eradicate all activities for assisting Chiang Kai-shek.

"Sometimes there are those who disapprove a change of the *status quo* by force of arms regardless of the reasons therefor. It is for the purpose of bringing about a just and permanent peace that Japan has been fighting in China for the past three years. Her employment of armed force is an act looking beyond the immediate present. The sword she has drawn is nothing other than a 'life-giving sword' that destroys evil and makes justice manifest.

"The countries of East Asia and the regions of the South Seas are geographically, historically, racially and economically very closely related to each other. They are destined to co-operate and minister to one another's needs for their common well-being and prosperity, and to promote the peace and progress in their regions. The uniting of all these regions under a single sphere on the basis of common existence and the insuring thereby the stability of that sphere is, I think, a natural conclusion.

"The idea to establish first a righteous peace in each of the various regions and then establish collectively a just peace for the whole world has long existed also in Europe and America. This system presupposes the existence of a stabilizing force in each region with which as a center the peoples within that region are to secure their co-existence and co-prosperity as well as the stability of their sphere. It also presupposes that these groups will respect one another's individual characteristics, political, cultural and economic, and they will co-operate and fulfil one another's needs for their common good.

"When the present European war broke out, the Japanese Government at once declared their policy of non-involvement and made it clear that this country did not intend to intervene in Europe and at the same time did not want to see the war spread into East Asia. Quite naturally Japan expects that the Western Powers will do nothing that will exert any undesirable influence upon the stability of East Asia.

Japan, while she is carrying on vigorously her task of constructing a new order in East Asia, is paying serious attention to developments in the European war and to its repercussions in the various quarters of East Asia, including the South Seas region. I desire to declare that the destiny of these regions—any development therein, and any disposal thereof,—is a matter for grave concern to Japan in view of her mission and responsibility as the stabilizing force in East Asia."

Last Minute Changes

Foreign Minister Hachiro Arita's pronouncements regarding world peace and the new order in East Asia were limited to a radio address instead of taking the form of a statement, as originally intended, because of dissatisfaction in military circles with the latter, according to Domei.

The situation requires action rather than the issuance of a statement, the military are said to believe, but if there must be a statement, it should be drafted with the utmost caution and in close consultation between the Government and the military authorities.

The alteration of the arrangements to issue a statement in the form of a talk to the press by the Foreign Minister came after a conference of the Foreign Vice-Minister, Mr. Masayuki Tani, the director of the Foreign Office, information bureau, Mr. Yakichiro Suma, other high officials of the Foreign Office the director of the military affairs bureau of the War Office, Major-General Akira Muto, and the director of the naval affairs bureau of the Navy Office, Rear-Admiral Katsuo Abe.

The *Hochi* claims that the opposition to the issuance of a policy statement was not limited to the military and was shared by some members of the Cabinet and its Advisory Council, who argued that another statement like those on the China incident issued by Prince Fumimaro Konoe, on non-involvement in the European conflict issued by the Yonai Cabinet last autumn and on maintenance of the *status quo* of the Netherlands Indies might have the effect of tying Japan's hands in dealing with diplomatic issues.

In abandoning the plan to issue a statement, the newspaper adds, the Foreign Office authorities are believed to have been influenced to some extent by the view of those who emphasize that Japan should take effective measures suited to occasions as they arise and maintain an attitude of exerting silent pressure.

Skeptical Approval in U.S.

While the State Department and the White House give careful study to the radio address by the Japanese Foreign Minister, Mr. Hachiro Arita, initial newspaper comment indicates that the United States has no objections whatever to Mr. Arita's enunciation of a Japanese "Monroe Doctrine" over East Asia on the face of it, at the same time expressing fear that in practice Japan may seek to use the doctrine as a cloak for Japanese domination in that part of the world.

Asserting that there would be little reason to quarrel with Mr. Arita's declarations if Japan itself intended to observe them, the *Sunday Star* says editorially that Mr. Arita's principles accord in many respects with established United States policy.

America has nothing to fear if Japan means only to serve as a stabilizing force in East Asia, says the *Star*, and as long as Japan makes no attempt to alter the *status quo* in the Orient to its own advantage.

However, it is argued, Foreign Minister Arita's reference to alleged affinity of East Asia with the South Seas regions in "a single sphere" hints strongly that Japan has no intention of abiding by present *status quo* limitations.

If Japan means to bring all of these regions under Japanese domination, that is a "prospect which neither the American people nor any other people interested in the Orient can contemplate without grave concern," it is said.

Other Washington papers maintain editorial silence, but the *Baltimore Sun* comments in a similar vein as the *Washington Star*. The *Sun* says that on paper the Japanese declaration does not seem to be objectionable.

However, the *Sun* adds that divergence of Japanese precept and practice makes for a certain skepticism. Although Japan's deep interest in Asiatic affairs cannot be denied, "too often professions of this interest have been followed by aggressive acts."

The newspaper affirms that the American Monroe Doctrine, except for a few cases which have been duly atoned for, has not been made an instrument for United States political and military domination of the Americas.

The paper concludes that whether the Japanese doctrine will be enforced similarly is a matter in which action speaks louder than words.

Meanwhile, despite official silence, the Associated Press reports strong indications that the Government here will not concur with the Japanese declaration, but the form in which a reply will be made has not yet been decided.

Possibly, Secretary of State Cordell Hull will make a statement, but no concrete moves are expected until it becomes clear what positive action Japan intends to take.

The British Viewpoint

Calling it a development which was inevitable after the defeat of France, the *London Times* says in an editorial titled Japan and the Pacific that Foreign Minister Hachiro Arita's declaration should occasion no surprise.

"It is difficult to assess the importance of the declaration until more light is shed," the *Times* says. "The most significant part of Mr. Arita's address was the inclusion of Eastern Asia with the South Seas, vast areas which he did not attempt to define but which might include anything from Java to Taihiti . . . . He has not defined developments which he appeared to anticipate.

"If he means that the wide regions of the Pacific and the Far East are to be regarded as a Japanese sphere of influence, where other Powers, if tolerated at all, are to keep their proper stations, then the claim won't be accepted by other nations, which have definite rights in those parts of the world.

"But if he only means that Japan expects to be consulted in any ultimate territorial or political changes in the Pacific, the demand is enough at a time when the foundations and frontiers of a great part of the world have been shaken or swept away by lawless violence."

The Japanese Government in allowing the pronouncement, the journal concludes, obviously is taking full advantage of the preoccupation of England.

Friends in the U.S.A.

Interest in possible American appeasement of Japan spread extensively in Congress as many Senators voiced open approval of Senator Arthur Vandenberg's radio address to the effect that the United States should attempt to improve relations with Japan.

Although practically all quarters insisted that there must be some settlement in China before Japanese-American relations can be restored to a firm and lasting basis of friendship, several influential Congressmen indicated moderate approval of the sudden move in favor of concluding a new political and economic treaty with Tokyo.

Most Congressional sources consulted by the Associated Press said they had listened to the radio speech of Senator Vandenberg and read other similar pronouncements with regard to Japan with "considerable interest." They observed that there are increasing proposals from various quarters for better relations with Japan.

Senator Elbert Thomas, Utah Democrat, expressed belief that Senator Vandenberg's assertions had reflected the growing effort of the State Department to improve Japanese-American relations. That feeling, he said, was seen in the Japanese and American pronouncements regarding the *status quo* of the Netherlands Indies.

"I personally feel," he declared, "we should have the most friendly relations possible with as many States as possible."

He added, however, that it is impossible in some instances in which interests clash and insisted that there must be a satisfactory settlement in China before a rapprochement with Japan can be possible.

Senator Guy M. Gillette, prominent member of the Senate naval affairs committee, asserted that he felt it would be "most helpful to improve relations, providing that in doing so the rights which the United States has sought are not jeopardized."

He said the commercial treaty was abrogated by the United States for the definite purpose of attempting to compel Japan to respect United States interests in the Far East. It would be unwise to retreat from this position, he said, without some kind of an understanding.

Senator Walter George, Georgia Democrat, contended that the present day-to-day commercial relations with Japan are accomplishing very little. Thus a return to the former full relations might be satisfactory, particularly as the abrogation of the treaty is being used to prevent the shipment of war materials to Japan.

Representative E. V. Izaac, California Democrat, voiced the opinion it would be "premature to negotiate a new trade treaty at this time." However, he said, if Japan respects Chinese sovereignty it would open the way for a complete rapprochement.

Urges Japanese Friendship

For the second the *New York Daily News*, America's leading tabloid, editorially urges the United States to make friends with Japan at an early date if it wants to help the Allies against Germany.

In an editorial titled Better Shut the Back Door, it says the United States cannot "lick the whole world for moral reasons or for any other" and suggests that it is wiser to make as many friends as possible before starting a crusade to put down Chancellor Adolf Hitler.

"Be nice to Japan now, and the United States may well be able to double the fleet's effective strength," it continues. "By making friends with Japan, the navy will be able to concentrate on its main purposes."

The newspaper contends that the United States had better begin to patch up its quarrels with Japan in the matter of trade relations to avoid "embarrassment" when it finds a victorious Germany in the Atlantic which may force a "grab by aggressive Japan in the Pacific."

The United States should avoid such embarrassment because it is now inadequately defended at home, because Japan is friendlier to Germany than to the Allies and because the United States may be unable to effect an Allied victory this time as Chancellor Hitler may win after all.

A Frank Admission

Senator David I. Walsh, Chairman of the Senate Naval Affairs Committee, on July 2 dropped a bombshell in his committee during the hearing on the appointment of Colonel Frank Knox as Secretary of the Navy when he revealed the opinion of the naval authorities that the United States could not successfully wage war against Japan without the aid of England and France.

Senator Walsh declared that Colonel Knox had believed before the capitulation of France last month that the United States should adopt a strong attitude in the Far East.

From an editorial in the newspaper of Colonel Knox, the *Chicago Daily News*, he quoted:

"We should not allow Japan to take the Netherlands Indies."

Colonel Knox added, however, that with the fall of France it would be unwise for the United States to participate in trouble in the Far East.

Senator Walsh then asked the new Secretary of the Navy whether, in changing his opinion with regard to the Far East, he had known that the naval affairs committee had evidence from the naval authorities showing that the United States could not successfully wage war against Japan without the aid of England and France.

Colonel Knox answered:

"Then we had better make no threats at all."

Analyses Situation

If the French navy is turned over to the axis Powers, "it stands to reason that the United States will be in no position to insist on the inviolability of Dutch, French and British territory across the Pacific," the *New York Times* says.

The influential newspaper makes this statement in the course of an editorial speculating on the Japanese "New Order in East and the Asiatic Monroe Doctrine."

It is clear, the *New York Times* continues, that the official stand of the United States cannot any longer be backed by armed force.

"We are now seeing that first demonstration of the thesis that British sea power is our first line of defense," the editorial says,

"Our diplomatic policy in the Pacific bears a direct relation, in the last resort, to the power with which that policy can be supported.

"Without British supremacy on the seas, our power in the Pacific may be enough for the defense of our own coasts but for nothing more."

Foreshadows Changed Policy

The view expressed in the Senate Naval Affairs Committee that the United States could not alone wage war successfully against Japan in the Far East is believed a further indication that America is eager to adjust relations with Japan, according to a dispatch to the *Yomiuri* from New York.

But it is dangerous to conclude, adds the dispatch, that America is ready to make concessions on the issue of adjusting relations.

Secretary of State Cordell Hull, the report continues, has voiced general opposition to Japanese policy as enunciated by Foreign Minister Hachiro Arita in his radio talk on June 29 and the United States believes in the maintenance of the *status quo* in the Far East.

The report says America will resist any attempt to change the *status quo* on the ground that such an attempt would be contrary to international pledges.

Although the United States is said to recognize that agreements on the Far East no longer meet the demands of the times, the fact that Americans insist on their observance is taken as an indication of the interest of Americans in the Far East.

One important reason why America is concerned about the Far East, says the report, is that it must turn to this part of the world to make up for the loss of the European market as a result of German success in Europe.

The dispatch says Foreign Minister Arita's radio talk and the series of moves taken by Japan to stop supplies from reaching the Chungking Government have caused a flurry of interest among those watching the Far Eastern situation closely.

Americans are said to be concerned about the attitude of Japan toward French Indo-China and are considering whether or not Japan will use force against Hongkong, Indo-China and the Netherlands Indies. Invasion of Indo-China is said to be considered a remote possibility.

In South China

Alleging that Hongkong is still supplying materials to Chungking, the Japanese landed troops in the area adjoining the British leased territory at Kowloon at dawn on June 22 in order "finally to cut off this route," according to an announcement issued by the Japanese army authorities in South China.

"It is significant that while war is raging in Europe," the announcement declares, "Hongkong is still supplying materials to Chungking. The Japanese army is taking such action finally to cut off this route."

The announcement reveals that "six Japanese units effected a landing in the Paoan district adjoining the British Leased Territory at Kowloon at dawn," and adds that "Japanese troops are now marching in the area north of the British border."

A statement issued in Hongkong by the British military authorities said the Japanese landing was in order to clean up Chinese guerillas.

"Japanese forces," the statement asserted, "are in the process of occupying certain areas adjacent to the Colony for the purpose of cleaning up Chinese guerillas."

It added that this intention was announced to the British military authorities and that there was no undue cause for alarm.

It was understood in Hongkong that altogether 400 Japanese troops landed at Namtau and marched overland to Shunchun, on the border of Kowloon, which had, in the meantime, been bombed by two Japanese planes.

On June 24, Japan formally demanded that Britain close the Burma highway and Hongkong for the transportation of war materials to Chungking.

Acceptance of the Japanese demand by Britain would leave China only the

Red Route from Russia by which to receive supplies from abroad. France accepted Japanese demands that the Chinese supply routes through French Indo-China be closed.

Results have been achieved by Japanese naval forces in the operations north of Hongkong, it was announced in a communique issued by the Press Section of the Japanese South China Fleet command.

The main force of the Japanese naval contingent on the South China Sea, under the direct command of the Fleet Commander, has been strengthening the coastal blockade in the south, while the naval flotilla on the Pearl River successfully assisted in the landing of army detachments for the Shunchun operations, the communique said.

Japanese naval air forces also were active in South China, successfully co-operating with the army operations and scouting and bombing Tamshui, Waiyeung and Pingtihu. Naval planes also destroyed supply routes in the vicinity of these points.

Hongkong Evacuation

The first boat load of women and children evacuees left Hongkong on July 1 for Manila, in accordance with the Government decree ordering all women and children under 18 years of age to evacuate the Crown Colony.

Government authorities reportedly are re-enforcing defenses at various points in view of the allegedly dangerous situation which prompted the evacuation order. The authorities are believed to be preparing to commandeer motor vehicles at any time and to register those qualified to drive them.

Following the example of the home Government, the Government-General also is said to have prepared decrees for the requisition of land, buildings, shipping and other facilities.

Although no official explanations have been given for these precautionary measures, the *Hongkong Telegraph* claims to have learned from Government sources that they are only meant to be prepared for any emergency.

"There is no danger and we anticipated none," an alleged Government spokesman is quoted as having said. "But we have seen that Italy was friendly enough at first but when things were going badly for us it jumped into the war against us. We are simply taking precautions to strengthen our position."

It is denied that any recent developments prompted the precautions, but "the next few months will be critical for the whole British Empire. We must consider the remote chance that the colony may become involved in fighting or a blockade."

The women and children being evacuated, it is said, will go first to Manila and after a short time they will be taken to the nearest place in Australia that can accommodate them.

American and British refugees numbering 2,900 persons who were advised to leave Hongkong arrived at Manila on July 3 aboard the *President Coolidge* and the *Empress of Japan*. More than 6,900 were expected to take refuge in Manila.

The United States High Commissioner, Mr. Francis B. Sayre, called on President Quezon to ask the Philippine Government to extend all possible aid to American and British evacuees.

President Quezon, following the interview, issued a decree prohibiting an increase in rents and instructed all officials to look after the welfare of the refugees.

Meanwhile, all hotels and furnished houses for rent are reported to be swamped with requests for reservations.

Malaya Prepares

Simultaneously with the re-enforcement of Hongkong's defenses, naval and military authorities at Singapore announced a tightening of Singapore's defense measures against any possible danger.

A communique announcing the precautionary measures had been taken said that the steps which are being enforced to bring Singapore's beach defenses to a higher pre-arranged state of preparedness were carried out in view of the general situation prevailing in the Far East.

"They should not be interpreted as indicating that any immediate danger is to be feared in Malaya," the communique said. "They solely are normal military precautions which are necessary at the present time."

It was added barbed-wire entanglements have been erected along the south coast and other areas of Singapore.

The official statement issued in Singapore is quoted as having said:

"Because of changed circumstances recently, additional steps are being taken to complete defense plans in Singapore, Penang and throughout Malaya.

"The work now has reached the stage where it is necessary to carry out demolition of obstacles along the south coast of Singapore and to erect barbed-wire entanglements both at that point and others. The step has been taken to bring defenses to a higher state of preparedness in view of the general situation prevailing in the Far East.

"It should not be interpreted as indicating any immediate danger to Malaya but should be taken solely as normal military precautions which are necessary at the present time."

Through Singapore flow each month thousands of tons of rubber and tin for British war industries. Exports are controlled to prevent any raw materials leaving for likely enemy destinations, and supplies to neutrals must be paid for in certain foreign currencies to increase England's resources of foreign exchange.

A big and complicated organization exists to-day to ensure the smooth working of the economic weapons which can be operated from Singapore. Foreign exchange control is one of the most important wartime departments, for Malaya normally has a big favorable balance of trade with most countries, especially the United States. To conserve the foreign exchange which this trade makes available, no export transaction is possible with a country outside the sterling bloc unless the authorities have approved the arrangements made regarding payment for the goods.

Last year the monthly excess of Malayan sales to the United States—chiefly tin and rubber—over purchases from America was at least $12,000,000. Under present conditions it is likely that Malaya makes available to Great Britain at least $10,000,000 monthly in U.S. currency to pay for war materials bought in America on the "cash and carry" principle.

By continuing to sell more goods to America than Malaya buys from America, the country is what has been described as a "treasure house" for the Empire. *No country in the Empire is so important* a supplier of foreign exchange for Britain as Malaya.

Linked with exchange control is the control of imports. Purchases from non-sterling countries are restricted to prevent foreign exchange being spent needlessly on goods that can as well be obtained from within the Empire.

Supplies From Indies

As a result of a series of negotiations conducted Japan and in Batavia, a fundamental agreement on trade between Japan and the Netherlands Indies has been concluded, the Colony having assured Japan of supplies of oil, tin, rubber, bauxite, nickel and chromium, which are considered essential war materials, according to the *Asahi*.

Negotiations now are being conducted to decide on details of the agreement, involving quantities of exports of the basic raw materials of the Indies and regulations of Japanese enterprises and Japanese entry into the Dutch colony.

Commercial relations between Japan and the Indies have been based on the Hart-Ishizawa agreement concluded in 1938. Execution of part of the agreement, however, has become impossible because of the China incident and the European war, says the paper. The understanding involved relaxation by the Netherlands Indies of restrictions on imports of Japanese goods. Last year, says the *Asahi*, Japan exported to the Indies about Y137,800,000 of commodities and imported about Y71,620,000.

Not Anti-Japanese

New York financial circles and tool buyers ridiculed reports that the United States machine tool embargo was directed at Japan. They denied that Japanese orders were slowing up the United States defence program.

Japan has not been a factor in the export of machine tools in over a year they said. Japanese purchases for the last two years or more have been confined to second hand equipment, they declared. The bulk of tool exports have gone to France, England, Hungary and the Balkans, these circles said. They estimated that 60 per cent of current tool production is confined to domestic purchases.

Tea Leaves from Lo Pat's Garden

by Shamus A'Rabbitt

The Eastern symbol of purity,
"The lotus in the stagnant pool,"
May typify the perfect soul
In an imperfect body
Or a high moral character
In an unwholesome environment
But many in the East
Have taken this
As justification
For living in complacency—
This esotericism
Disregards the
homely philosophy
Which teaches that
He who strives to better
The world
Is more blessed than a saint
In a cloister.

◆◆◆◆◆◆

The stagnant pool may be all right
For the lotus
Or the perfect soul
But it is a damnable place
To rear children.

◆◆◆◆◆◆

A fair flower in an ugly environment
Can be an object for profound contemplation
But it never buys champagne for the baby.

◆◆◆◆◆◆

A girl who marries
To avoid earning her living
Is like a man
Who burns his house
For insurance
And is caught in the act.

◆◆◆◆◆◆

Old Nature is the traffic cop
Who hits us in the stomach
To make us stop
On the speedway of our pet vices.

◆◆◆◆◆◆

The mantle of years
Is cut to a small pattern
When we return to old haunts.

◆◆◆◆◆◆

Returning to old landmarks
Is like the effervescence started when
Old wine strikes the air.

Scenes of former sorrow
Strike us
With a pent of force
When we visit old scenes.

◆◆◆◆◆◆

The memory is like a wine cellar
Where the vintages of emotional years
Are stored.

◆◆◆◆◆◆

Blessed is he who stores the wine
Of happy memories
Instead of a sour vintage
To be uncorked in later years.

◆◆◆◆◆◆

To accept a favor
Graciously
Is the hall mark of
Greatness.

◆◆◆◆◆◆

Our most
Disagreeable experiences
May become
Our most cherished
Memories.

◆◆◆◆◆◆

Time may solve all problems
And cure all ills—
Though the horse might die
While the grass is growing.

◆◆◆◆◆◆

The problem of marriage
Can be solved only
By those who do not marry.

◆◆◆◆◆◆

For the married
There are as many solutions of marriage
As there are marriages.

◆◆◆◆◆◆

Many a man who is inherently honorable
May resent being forced to honor by a yoke.

◆◆◆◆◆◆

Lovers meet only when in the mood
for each other—
Married folk are victims of all moods.

◆◆◆◆◆◆

When a man must have a discussion with a woman
Over a leak in the kitchen stove-pipe
Love flies out the window.

◆◆◆◆◆◆

Money may not make a happy marriageship
But it goes a long way towards
Sending a troublesome mother-in-law
To the sea-side.

The Problem in the Pacific

By C. J. LAVAL

Quite realistically, perhaps appropriately, Japanese leaders of the day are taking a familiar English axiom as a text to define their views and their attitude toward recently changed political trends in the United States. "Actions," these leaders say, "speak louder than words."

The "friends of China" in their various guises in the States, and the clamorous groups that have been advocating hostile action toward Japan, have been silenced by the thunder of German guns along the English Channel. Realistic concepts in American public opinion at length have begun to displace sentimental viewpoints and emotionalism. Talk of punitive action, such as imposition of a general trade embargo by Washington, made possible by the abrogation of the Japanese-American Trade Treaty, has subsided and no longer is heard from platform or in the press. Into the writings of influential publicists, and into recent utterances of American political leaders it seems there has crept a suspicion that perhaps lines of policy the American State Department has been following in the Far East may not have been wholly prudent, or in the best interests of the American Nation.

In a world turned upside down important American groups have begun to see virtue in Japanese friendship, and voices that must command respect are urging the Washington Government to adjust outstanding differences with the Tokyo Government and, as a step toward restoring amicable relations between the two Nations, to effect the conclusion of a new trade treaty with Japan.

All of these things denote a significant change in American public opinion regarding China and Japan, an awakening to the realities of the situation in the Far East. This shift of American viewpoint, to be sure, is being observed with interest, but with little comment, by leaders of the Tokyo Government. When questions are put about the subject, whether to officials of the Army or Navy Ministries, or at the Foreign Office, the invariable terse answer given is, "Actions speak louder than words." From this it would seem to follow that with regard to the United States the Tokyo Government is in an expectant and receptive frame of mind.

Major Question in the Pacific

How much longer Japan will continue to follow her present-day policy of non-involvement in the European conflict, and what course she will take if and when she modifies her position, are the most important questions having to do with Pacific affairs today. On the manner in which these questions will be answered in coming months depend all the interests, perhaps even the lives, of the many Occidental nationals living in China. Opinion in Japan itself is far from being unanimous at this time. Highly influential political elements in Tokyo form a pro-Axis group clearly in favor of an armed alliance with Germany and Italy. If their will prevails and their aims are brought to realization, then it is inevitable that far-reaching changes will be brought about in the Pacific. In such a contingency the war in Europe assuredly will be extended into Asia.

The Japanese Government has announced itself as opposed to any extension of the European conflict into the Pacific, but at the same time it is quite apparent that majority opinion in Japan is in favor of, and expects a German victory in Europe. Recently the Japan University Professors' League, following the example of the Gallop polls in the United States, mailed out a questionnaire to obtain upper-class opinion regarding the war in Europe and the situation in the Pacific. The questions were sent to 46,000 homes throughout the country most of which have students enrolled in the leading universities in Japan. The replies received indicated that three-fourths of those questioned are indifferent or apathetic about international affairs. The majority of the remainder want to see Germany defeat Great Britain, but are opposed to Japanese participation in the European conflict as a means to bring the China incident to a close. A large majority of those who sent replies declared that Japan should go to war with the United States if the Washington Government attempts to obstruct Japanese acquisition of the natural resources in the Netherlands East Indies. A great majority of those answering favored the formation of a single political party in Japan.

Keeping An Eye on Russia

The replies given to the questionnaire of the University Professors' League undoubtedly afford a fairly accurate appraisal of the popular trends of thought in Japan. While important groups in Japan believe that major advantages are to be won for their Empire through alliance with Germany and Italy, involving opposition, if not outright hostility, toward the United States, even the most ardent pro-Axis exponents definitely limit Japan's participation in any such course to the sphere in the Pacific. No elements in Japan favor any course that might involve Japan in the conflict in Europe itself, or in European waters. It is probably true also that no arrangement would be approved that might lead to some form of alliance with Soviet Russia. In recent developments in the Near East and in the Balkans the apparent opening of a breach between Hitler and Stalin has been observed by Japanese leaders with acute interest. If this breach widens in the near future the chances for a Japanese alliance with the Axis powers will be increased.

From utterances of pro-Axis leaders in Japan it is apparent that they believe that Germany will succeed in invading and conquering the United Kingdom after which Hitler will dominate all Europe. Based upon this assumption, what the pro-Axis elements in Japan probably envisage is a vast division of world spheres in the eastern hemisphere, a division that will leave Germany the single dominant power in Europe while domination of all East Asia and the western Pacific will fall into Japan's hands. Such a development would involve a war with Soviet Russia waged by Germany in European Russia and by Japan in the Far East.

It is calculated that by reason of American forthright opposition to warfare, and to the state of unpreparedness in the United States that American statesmen recently have been admitting so frankly, no effective obstruction from the Washington Government, and no armed intervention in the western Pacific may be expected. The pro-Axis proponents thus see in the situation a golden opportunity for Japan to uproot and remove from China and the Far East all Occidental interests and influence, and to expand southward, coming into a position dominating all the present vast Far Eastern holdings of all the European powers. For the present the Philippines may be left out of these calculations, for Japan has no desire to incur further American ill-will. It may be anticipated that when the Philippines at length acquire independence in 1946, an untrammelled Government of the Philippines may itself voluntarily seek inclusion in the regional bloc of nations that Japan as the paramount Far Eastern power shall have then created. Such eventualities follow nicely the system of regional divisions of the nations of the world envisaged in the recent broadcast made in Tokyo by Hachiro Arita, Japanese Foreign Minister.

Former Ambassador Predicts New War

The belief that a war between Germany and Soviet Russia will follow on conclusion of the present phase of the European conflict was expressed recently in a singularly frank statement by Lieutenant-General Oshima, who at the time last year when he was Japanese Ambassador at Berlin, was one of the original proponents of an alliance between Japan and Germany. In an interview with the Osaka *Jiji* early in July the former Ambassador to Germany, who is a staunch advocate of National Socialism, asserted that he was firmly convinced that a war between Germany and Russia will take place.

"Hitler," he explained, "has a confirmed belief that Russia must be defeated in war, not because Russia is a Communist country, but because Hitler believes that the Slav race is impeding the progress of the German people." General Oshima added that it was a special characteristic of Hitler's methods to avoid facing two adversaries at the same time. Therefore, while relations between the United States and the Third Reich never can improve, Hitler will refrain from alienating Soviet Russia and the United States simultaneously.

While the Japanese pro-Axis advocates eloquently enumerate the many glittering advantages to be won by Japan through alliance with Germany and Italy, it seems significant that any clear and definite statement with regard to The Far East from Herr Hitler, or from Berlin, conspicuously is lacking. Following the victorious march of the German armies through Holland the Japanese Foreign Minister proclaimed promptly that Japan would view with the utmost concern any change in the status of the Netherlands East Indies, and a statement of the same tenor followed from Mr. Cordell Hull, American Secretary of State. In response, among other replies, an announcement made at Berlin set forth in general terms that Germany had no special concern with the Netherlands East Indies. A section of Japanese opinion seized upon this German statement and interpreted it to mean that Germany would not object to any moves Japan might see fit to make in the East Indies.

What Will the Costs Be ?

This appears to be the full extent to which Germany thus far has gone in support of Japanese aspirations in East Asia. Between Japan and Germany, and Japan and Italy, in recent times have occurred many superficial evidences of amity and good-will. Undoubtedly political agencies of these powers have been actively at work, but if any arrangements have been made leading to an understanding involving definite commitments of "high contracting parties," then these are being kept closely hidden in the diplomatic pouches and no word about them has been given to the press. In short, up to this time much has been said and published of the gains Japan may win through alliance with the Axis powers, but no light has been thrown on what she must yield and concede under any such arrangement.

It is evident that German successes in the European war have placed Japan in her present advantageous position with regard to Far Eastern possessions of European powers. What further advantages can Japan gain by throwing in her lot with the Axis powers, and what things must she yield if she takes this course ? The things that she must surrender if she enters such an alliance all lie within her own Far Eastern sphere where up to this time German and Italian interests have been but negligible. In this Far Eastern sphere are resources and rich stores of materials lacking in other parts of the world and coveted in all world markets. If Germany and Italy aid Japan in winning these rich stakes, what price will Japan have to pay ? And will the intrusion into the Far East of German and Italian influence and activity be welcomed by Dai Nippon as helpful in carrying out her purpose to found a "New Order in East Asia ?"

The Economic Phase

Japan has won a pre-eminent position in world trade. What new markets may she gain through alliance with the European Axis, and what trade outlets and contacts must she lose, remembering that the preceding Great War grew out of European trade rivalries led by Germany ? In the field of international commerce Japan has been for some time the third best customer of the United States ; she probably has become the best customer in view of the European conflict. Japan's best customer in foreign trade is the United States. This commerce between the two powers is complimentary, not competitive, and therefore is carried on for the highest possible mutual advantage of the two Nations. In view of the state of relations between the United States and Germany, what effect may be anticipated on this trade if Japan enters an alliance with the Axis powers ?

In the folklore of Dai Nippon is an ancient proverb which says that "In Government there can be but one Imperator." If a Tokyo-Berlin-Rome alliance is concluded, will Herr Hitler agree that Japan shall be a co-ruler within her own sphere, or will the German Fuehrer concede to Japan only as much power as he has conceded to Italy ?

It may be pertinent in this general connection to recall that a basic purpose of the Hitler régime is to regain for Germany all her colonies and possessions lost in the preceding World War. Japan holds under League Mandate, and since the League of Nations is virtually defunct, she holds unconditionally, all the islands of the Pacific North of the equator save the Hawaiian Group, Guam and several lesser American island possessions. Germany lost these islands in the earlier war and in line with his announced purpose Hitler will desire their return to Germany, whether or not an alliance is concluded.

In the complex tangled world situation of the present day Nipponese statecraft will strive to seek out the one course to take that will be in the best interests of the Japanese Nation. Much more than in any other phases of life is it true that in international exchanges, in diplomacy, it is not possible to get something for nothing, so the gains must be weighed and measured carefully against the consequent losses. Looking a bit into the future, it must be taken as true also that a *blitzkrieg* works as calamitously in one part of the world as in another. And, since the Japanese have a regard for proverbs it may be repeated with propriety that "Old friends make the best friends."

A Japanese Monroe Doctrine

In the United States the recent broadcast of the Japanese Foreign Minister regarding regional groups of nations was regarded as the enunciation of a Japanese Monroe Doctrine applicable to the Far East, and it should be remembered that it was a former American President, Roosevelt the First, who advised Japan some thirty-odd years ago to proclaim a Monroe Doctrine for East Asia. Of the utmost importance and significance in connection with the Far Eastern situation was a statement issued on July 6 by President Roosevelt. In this statement the American Executive held out the olive branch to Japan, for, superficially at least, his words approved and gave endorsement to the broadcast statement regarding regional groups of nations that had been issued a week earlier in Tokyo by the Japanese Foreign Minister.

"There is complete absence of any intention on the part of the United States," said President Roosevelt, "to interfere with territorial questions involved in readjustments in Europe and Asia. . . . The United States Government wants to see and thinks there should be application of a Monroe Doctrine in Europe and Asia similar to the interpretation and application of those principles in this hemisphere."

How the American President's statement was received in Japan is best expressed in the words of the Spokesman of the Japanese Foreign Office, Mr. Yakichiro Suma.

"Regardless of whether or not President Roosevelt's statement on the Monroe Doctrine constitutes a new definition and modification of that doctrine," said the Japanese Spokseman, "the fact cannot be disputed that the attitude taken by the President and the Secretary of State of the United States on the question shows that the United States Government has converted the primarily passive and defensive character of the Monroe Doctrine to a positive one.

"Hitherto the Monroe Doctrine has been applied to prevent the extension of the European system of Government to the Americas, as well as to forestall aggression of outside Powers on the Western Hemisphere. Now it is claimed that 'the United States very sincerely believes and maintains the position that the administration or ultimate disposition of such islands and territorial possessions should be and is properly a question to be decided by and among all of the republics of the Western Hemisphere.'

"If this is the real attitude of the United States, it naturally coincides with the idea of regional structure which has recently been suggested by Mr. Arita, the Foreign Minister. In fact, President Roosevelt declared that 'the United States Government wants to see and thinks there should be application of a Monroe Doctrine in Europe and Asia, similar to the interpretation and application of those principles in the Western Hemisphere'."

Factors in the Situation

Although through recent years relations between the United States and Japan have been exceedingly strained, and the attitude of the American Department of State regarding Japanese activities on the continent has been critical and uncompromising, it may not be denied that some portion of the American popular hostility and ill-will toward Japan is an *ersatz* product synthetically produced by special interests into whose identities and motives it is needless to go here.

It may be found at length that in many of the fundamentals the Washington Government can discover reason to accept and endorse principles underlying Japanese actions and aims. Succeeding Tokyo Governments have disclaimed any territorial ambitions repeatedly, and repeatedly Japanese statesmen have given the pledge that third power rights will be respected. It must be accepted that difficulties and obstacles arise in safeguarding rights and interests of third powers in a land in which a war is being fought. Wartime necessities know few rules and can give scant heed to bystanders or their interests. Japan cannot be accused of bad faith in this respect until the fighting in China is ended.

The position taken by the Washington Government is that the property and the lives of Americans living in China must be safeguarded, and that American rights under existing treaties must be respected. To these things, in repeated utterances of her statesmen, Japan has assented, although many Americans in China contend that these assurances have not been fulfilled. Military necessities in a time of war invariably up to this time has been the Japanese rejoinder.

The Open Door and respect for the territorial and administrative integrity of China, upon which the United States Government traditionally has insisted as twin tenets of American Far Eastern policy, must be revalued and considered to-day upon the basis of the existing greatly changed state of affairs in China. China now has two conflicting régimes, one the Chiang Kai-shek Government at Chungking, which holds recognition from the great Occidental powers, and the other the newly founded Nanking Government under Wang Ching-wei. The Nanking Government grew out of acceptance by a faction of Chinese of peace terms laid down by the Tokyo Government, and this new Nanking Government, denied recognition thus far by Western powers, just now is in process of receiving recognition from the Tokyo Government and perhaps from several European states.

It is rather more than doubtful if the recognized Chungking Government can overcome the many hazards that encompass it in its remote seat in the deep interior of the country. Deprived of virtually all revenues, in controversy with Chinese Communist groups linked with Moscow that hitherto have aided it in its resistance of the Japanese invasion, and cut off from practically all sources of supplies by a Japanese blockade, this Chungking Government can scarcely be expected to survive. If the Chungking Government disappears, then the unrecognized Nanking Government of Wang Ching-wei will be the only régime left in the land with which overseas powers can treat.

On the subject of the Open Door in China for commerce and respect for the territorial and administrative integrity of China, upon which the Washington Government insists, the Nanking Government has distinct ideas of its own, according to statement made by Mr. T'ang Leang-li, an official of Wang Ching-wei's régime. This Spokesman for Nanking charges that these two tenets of American policy in China are directly contradictory.

"The Government of China may object to maintenance of the Open Door for commerce in China," explains Mr. T'ang Leang-li, and he adds, "If the American Government takes an opposing view, and insists on its Open Door policy, then what becomes of the administrative integrity of the Chinese Government, upon which the Washington Government also insists."

It appears to be a foregone certainty that the new Nanking Government of China will have to be taken into consideration in any future moves the Washington Government may see fit to make in the Far East.

The Port of Saigon

SAIGON, situated on the Saigon River at a distance of 45 miles from the sea, is the most important port of French Indo-China and one of the leading rice-exporting centers of the world, the annual shipments of this commodity usually approximating some 1,500,000 tons. Rangoon, in Burma, and Bangkok, in Thailand (Siam), are the two other great rice ports of the Far East.

Saigon is easy of access, the width of the river from the sea to the port being never less than 300 meters (984 feet). The channel that can be used is wide and has a depth of 9 to 12 meters except in two places, Coral Reef and Nhabe, where the depth at low water is approximately 7 meters. The harbor is accessible at all times to ships up to 600 feet in length, drawing 30 feet. As a rule, ocean vessels use the flood tide for ascending the river, but the ascent can be made at all states of the tide. The tides sweep the river clear of mud and the depths are maintained without any dredging or other operations.

The commercial port of Saigon lies downstream from the French naval port and, in addition to the wharves on the banks of the river, includes a number of canals—the Arroyo Chinois, Canal de Derivation, Canal de Doublement, Canal des Poteries, and the approaches to the port.

Formerly the fluvial port, or that part reserved for the local traffic plying on the many rivers and canals of Cochin-China, consisted solely of the Arroyo Chinois. However, since the Arroyo was shallow and almost without water at low tide and was almost continuously congested with junks unloading rice from interior points, the Canal de Derivation was dug in 1906 to provide better accommodations. Later, in 1919, the Canal de Doublement, with three connecting sections, was built parallel to the Arroyo Chinois and the Canal des Poteries. These new canals are now becoming more and more the great arteries that are used by the local traffic. The importance of the fluvial port can be realized when one sees the thousands of small craft unloading rice on the canals and rivers or loading rice for transport to ocean vessels.

Berths for ocean-going vessels are provided on both sides of the Saigon River for a distance of nearly 4 miles below the naval port. Along the right bank of the river is Khanh-hoi Wharf, 3,385 feet in length, with deep-water berths for about 9 vessels. This wharf is equipped with 6 movable electric cranes for cargo handling and 11 steel frame-covered warehouses. Up stream from Khanh-hoi Wharf is the privately owned wharf of the Messageries Maritimes with a length of 1,246 feet and three berths reserved exclusively for the vessels owned by this company. Below the Khanh-hoi Wharf there are 5 berths for ships at buoys on the right bank of the river.

On the left bank of the river there are 12 berths at buoys, all accessible to the largest vessels entering the port. These berths, as well as the ones at the buoys on the right bank, enable vessels to handle cargo on both sides and thus effect quicker despatch. Ordinarily, all inward cargo is handled at the berths along the Khanh-hoi Wharf and vessels arriving with cargo for Saigon are required to use these berths if they are available. Steamers in ballast and calling at Saigon to load outward cargo usually are berthed on the left bank of the river.

In addition to the foregoing berthing space reserved for overseas vessels, there are three berths at the Canton Wharf and the Charner Wharf between the Messageries Maritimes Wharf and the naval port which are reserved for river vessels plying on the Mekong River, the Mississippi of French Indo-China. Using all berthing space in the port and anchorages in the stream, from 40 to 50 large vessels can be accommodated at Saigon at one time. Over 100 steel lighters with a total capacity of 15,000 tons, and about 600 junks with a total capacity of 60,000 tons, are available at the port for the handling of cargo.

While rice is the most important of Saigon's exports, other products shipped overseas in considerable volume include corn, hides, rubber, fishery products, pepper, copra, teak, silk, gums, and kapok. The most important harvest of the rice crop in Indo-China is in February and March. Large amounts of new rice are sent immediately to the godowns in Saigon for export, but important stocks are usually kept out in the Provinces for future shipment. There is, therefore, a steady flow of rice out of Indo-China, with peak shipping months in March, April, and May. Imports at Saigon consist principally of general merchandise and manufactured goods such as textiles, hardware, chemicals, flour, petroleum products, paper, machinery, and other iron and steel manufactures. About 1,000 vessels call at Saigon each year, many of which are tramp steamers of all nationalities chartered to carry rice to overseas destinations.

Senator Pittman's Committee

By *WALTER LIPPMANN, N.Y. Herald Tribune*

By arms alone, absolutely indispensable though they are, neither this nation nor any other can make itself secure. A nation, however highly armed, must have a sound foreign policy or it will find itself at last in mortal peril. The principles of a sound foreign policy are self-evident: they are, first, that a nation must cultivate the support and the friendship of those other nations whose fundamental interests are similar to its own; second, that among its potential antagonists it must seek to conciliate and find the ground of compromise with those nations which do not directly and immediately threaten its own vital security and independence; third, that when a nation must defend itself, it will arrange to defend itself not on its own doorstep but at a distance where its opponent is least able to strike back effectively.

The nightmare of all statesmen who have ever understood the realities of national defense has been that their country might find itself isolated without allies amidst a coalition of their country's opponents. To let a situation of this sort develop is to mismanage foreign affairs to the point of disaster. The foreign relations of the United States have been mismanaged to the point of disaster. We face the imminent prospect of finding ourselves isolated in the face of an armed and inimical coalition in both oceans. If this perilous situation is to be redressed, the responsibility must be fixed and the causes remedied.

The awakened people of the United States need to fix their attention upon the Foreign Relations Committee of the Senate. Let us not confuse ourselves by naming names; let us grant without reservations that all the members of the committee have been and are without exception sincerely patriotic. Let us impugn no man's sincerity or doubt the honesty of his intentions. Let us look only at the record of this committee during the past 12 months, remembering that this committee has had the last word in the conduct of American foreign policy, and that its acts—much more then the proposals and purposes of the President, the Department of State, the Navy and the Army—have determined the position of this country in the world to-day.

Isolation Seen

In July a year ago the situation, known to all informed observers, was as follows: A great war in Europe was unavoidable as long as Mr. Hitler was convinced that he had the power to win it. Mr. Hitler was allied with Italy and had a loose pact with Japan.

Confronted with this situation, what was the foreign policy of the committee last July? The committee did two things. It incited, approved, and supported the policy of challenging Japan by abrogating the commercial treaty and threatening to impose an embargo. Second, the committee refused to relax the so-called neutrality law which would, in case of war, prevent the Allies from buying planes and other materials of war. Thus the net result of the committee's control of foreign relations was to challenge Japan in one ocean while refusing help to our natural and historic allies in the other ocean. This was called a policy of peace. But it is not a policy of peace to challenge the greatest naval power in the Pacific. It was called a policy of isolation. In fact it was a policy of making certain that if we ever have to go to war, we shall be isolated.

The war, which controlling elements in the committee pooh-poohed, broke out in September. Because it did not begin with a furious battle on the western front, many of these gentlemen who are entrusted with the destiny of America decided that it was a "phony" war. They, therefore, insisted upon enacting a law, called a neutrality law, which relaxed the prohibition on the sale of arms on condition only that the country would put itself in a strait-jacket, would renounce its historic rights upon the high seas, and would scuttle and run from any and every effort to uphold international law. Because the lifting of the embargo in planes was known to be a matter of life and death, those who understood the situation paid the price demanded and they have loyalty adhered to the bargain.

Total War Began

In May the "phony" war became the dreaded total war, and as the Nazis cut their way to the Channel ports, the country as a whole, and even the committee, realized that if the Allies fall, the security of this hemisphere is gravely imperiled. In this crisis the committee has again made two contributions to the situation. And exactly as in July a year ago, it has again challenged one country while refusing to lend assistance to the nations which are resisting the country that the committee has challenged. Toward our potential opponents it is again provocative and toward our Allies it is still "neutral." In the past week the committee has voted to defy Germany if, the victor in Europe, it claims as the spoils of war the American colonies of the Netherlands, France and Britain. It has also voted down the furnishing of the help of the Allies who are fighting to prevent Germany from obtaining the victory which, in its consequences in this hemisphere, the committee has decided not to recognize.

Not content with having challenged the potential victors in Europe, this committee has by implication given a blanket guaranty to all republics in this hemisphere. Having given the guaranty, by reaffirming the Monroe Doctrine at the very moment when it is more seriously challenged than at any time since before our agreement with Great Britain in 1823, the committee in its report has announced that in undertaking this task the United States would, of course, like "to consult" with its neighbors, but that "there are no obligations upon any of the American republics, which of course includes the United States, to be found by any action taken at any consultation."

The committee certainly has a good appetite for taking all possible chances that the United States shall be thoroughly isolated in a critical emergency. Its view is that we must now know definitely in advance what the American republics will do in order to defend this hemisphere, and that they must not know definitely in advance what we shall do. If any one can think of a more foolhardy method of making the Monroe Doctrine mean that we are involved all over this hemisphere without certainty that we shall get support, what is it? One would suppose that the most elementary common sense would have persuaded the committee that binding obligations in the form of treaties of mutual military assistance were imperative and indispensable.

This is the record of the Senate Committee on Foreign Relations during the most critical period of modern history. On this record the committee, as now constituted, is incompetent. To leave in such incompetent hands the decisive power which this committee exercises is a danger to the security and the independence of the American people.

TOKYO AS AN OPEN PORT

Tokyo municipal authorities are backing a movement to have the port thrown open to foreign trade, as present conditions tend to cripple the industries of the capital, which now ranks as Japan's most import manufacturing center.

Though playing an important rôle in the industry and economy of Japan, the port of Tokyo is not open to foreign commerce, consequently foreign ships and Japanese vessels engaged in foreign trade are barred from entering it and have to tranship at Yokohama, and elsewhere.

Nevertheless in 1938 a total of 3,087 vessels, aggregating 7,950,000 tons entered the port of Tokyo. They brought in 6,340,000 tons of freight and took out 900,000 tons, the total value of the cargoes being nearly 1,000 million yen.

Neutrality in the Sino-Nippon War

By WILLIAM R. CASTLE, Former American Under-Secretary of State

Before a government takes any action in an international dispute, it should be certain that it has the correct answers to at least two specific questions. These are: Do we fully understand the circumstances which appear to make action necessary? Will the action, if taken, accomplish the purpose intended?

The bald facts of the situation in the Far East at the moment are these: Japan began to fight against the Chinese some three years ago in retaliation for a minor attack on Japanese troops near Peking. Instead of merely punishing the Chinese locally for this local attack Japanese troops began to march against all parts of China. Thus, what ought to have been merely a local engagement became a huge although undeclared war. What is more, this war has been carried on with little regard for humanitarian principles.

It has resulted in the death of millions of Chinese and certainly of hundreds of thousands of Japanese. The end is not yet surely visible. Many people in this country hold the United States guilty for the Chinese casualties because, as they put the matter, we have sold to Japan a large part of the oil which has flown Japanese planes, and a large part of the scrap iron which, made into bombs and dropped from the air, has slaughtered civilian Chinese as well as Chinese soldiers.

That is the picture. The facts cannot be disputed. But when we turn to the interpretation of these facts, try to get the background which explains them, we are no longer sailing before the wind. We find that we must chart our course and that this can be done with some hope of success only through the exercise of reason. If we are honest with ourselves most of us will admit that we have hitherto been trying to do it through our emotions. These emotions, which are in themselves wholly laudable, tell us that because Japan has invaded China and because the Japanese Army, in its advance, has behaved in a reprehensible manner, therefore it is our duty to defend China and punish the Japanese.

If this argument is valid we should have defended Finland and punished the Russians; we should have defended Poland and punished both the Germans and the Russians; we should have taken up the cudgels for Czechoslovakia and punished the Germans, the Poles and the Hungarians, since all of them seized pieces of Czech territory. In other words, if we tried to be consistent we should find ourselves involved in every dispute that occurred in any part of the world, especially if a small or a weak nation was being put upon. The friends of to-day might well be the enemies of to-morrow. I am afraid the lot of a world policeman would be a sad one. If we interfered in all directions we should soon have the world against us.

We know that the Japanese have moved into China but we do not know, as we deceived ourselves into thinking we do, that their reason was mere wanton lust for conquest. We sneer when Japanese spokesmen tell us that the "China incident" occurred only because it is an essential step in bringing about a New Order in East Asia—but have we the right to sneer at something which we do not understand, something which is earnestly and solemnly believed by a majority of the Japanese people?

When American troops moved against Mexico 100 years ago, when as a result of that war we took over New Mexico and Arizona and California, the majority of the American people believed that we were doing a beneficent work. It has turned out that we undoubtedly were doing what was best for the Western Hemisphere, but the manner of doing it looked pretty callous and cruel even to some Americans of the time and the perspective of history adds no luster.

Foreigners, however, had no right to condemn the idealistic enthusiasm of the mass of Americans and we of to-day have no right to condemn the equally idealistic enthusiasm of the mass of the Japanese. We cry out against Japanese "imperialism" but we condone similar advances when made by our friends or by ourselves. We ought to try, at least, to look at a situation from the point of view of the actor in that situation. Japan probably discounted our protestations of virtue when we took over the Philippines—but it did not threaten a break in trade relations as a punishment. We in this country are generally inclined to be for the underdog, whatever its characteristics may be.

It was this sentimentality which made us so vociferously on the side of Japan at the time of the Russo-Japanese war, even though many of us felt that Japan was responsible for the outbreak of the war. China is the underdog to-day, although the Chinese millions far outnumber the Russian millions. But they are unorganized, lacking in more than local patriotism, and this gives little Japan, with its intense patriotism and splendid organization, its overwhelming advantage.

Another reason for our intense emotional partisanship is that the Japanese Army has advanced ruthlessly, leaving a trail marked by ruined cities, bombed from the air, of almost desert areas where the peasants have been driven from their homes. There is nothing more horrible than bombing from the air because it means the death of innocent women and children. But, remember that the Japanese bombing in China has been no worse than the German bombing in Poland, far less terrible than the Russian bombing in Finland. Remember, also, that the nations assembled year after year in Geneva to study reduction of armament could never reach agreement on this subject.

Even good Christian nations do not seem ready to give up an advantage for the sake of humanity. As to the lack of discipline in the Japanese Army, this seems to me in the long run far more serious for Japan than for China. One of the fine qualities of the Japanese soldiers has always been his obedience, his orderliness, his submergence of self in his devotion to the cause of his country. Much of this has been lost in the China campaign, and the soldier, it is to be feared, has learned from his own officers to flout discipline. If this demoralization continues it will mean that Japan will face revolution after the war, may well lose its own soul.

Lastly we are told that since Japan has broken the Nine-Power Treaty, which purported to safeguard the territorial and administrative integrity of China, the United States must fight, if necessary, to maintain the terms of the treaty. It is solemnly pointed out that, unless there is respect for international engagements, the fabric of society must crumble. But, it is not pointed out that in this particular treaty no one nation among the signatories was selected to ensure the enforcement of the terms; nor that the treaty is in reality only a statement of principles with no method of enforcement signified.

Certainly there is no reason why the United States alone be selected to enforce the principles of a treaty when these principles can be enforced, if at all, only by united action which, under the circumstances of the world to-day, is obviously impossible. The destruction of the treaty really occurred when Japan took Manchuria away from China and made it a more or less independent state. The signatories of the Nine-Power Treaty would not act then; they are far less likely to take action now when a war is going on in Europe, a war in which the more important are engaged and one which rages against the shores of the others.

That point about the impossibility of common action was brought out the other day before one of the most earnest advocates of an embargo on American trade with Japan. His immediate reaction was in a question which he, to himself at least, answered affirmatively. "Then, if the others can do nothing, don't you realize that the United States must?" Nothing could be more disastrous than a glib answer to such a question. Not only the United States, not only China and Japan, are likely to be profoundly affected by what we do.

Our action might well turn the entire course of the war in Europe. Most thoughtful men would say, therefore, that the answer must be in the negative so far as what the President calls "actions short of war" are concerned. "Are you then unwilling to help the Chinese?" is the immediate cry—a wholly unfair cry as I shall try to show. In fact, I am afraid the proponents of an embargo on trade with Japan have rather lost sight of China in their eagerness to hurt Japan.

If an embargo on trade with Japan would not endanger the United States ; if it would not jeopardize the chances of success in the war of our natural friends, the British and the French ; if such an embargo would stop the Chinese-Japanese war ; would put an end to the spirit of aggressive militarism in Japan ; if it would give China a chance to go forward as a wholly independent and democratic nation ; under all these circumtances there is no doubt that the majority of Americans would vote for an embargo. Unfortunately, there is no reason to believe that it would have any of these positive effects and there is every reason to believe that it would be dangerous to the United States and to the Allies.

Let us take first the positive points, remembering that we have passed from the realm of fact into that of theory and speculation. An embargo on the sale of war materials would certainly not stop the war with China. In fact, this is almost too absurd to discuss. Japan has not been idle since there appeared to be some danger of an embargo.

It has made arrangements, we may be quite sure, to get all the oil it needs from Mexico and the Dutch East Indies. I reminded one of the Japanese who told me this that the Mexican oil would be stolen oil, but he said that, as we had done nothing about it, he did not see why Japan should worry. Stocks of scrap iron in Japan are said to be adequate to continue the war for some time—and we must remember that Japan does not expect the war to continue for any length of time. As it is, we are selling neither finished war materials nor airplanes. Such an embargo would undoubtedly inconvenience Japan but that is all.

It would, of course, mean the end for very many years of all Japanese-American trade, and most people forget that this trade is exceeded only by that with Great Britain and Canada. It has always been many times the amount of our trade with China. It would cause great suffering among the people who raise silk, but no more than among those of our own people who raise cotton.

In other words, an embargo against Japan would have little effect on the war, but would alienate the two countries because it would disrupt all normal relationships. It would deeply offend Japan. It would not destroy the spirit of aggressive militarism in that country. On the contrary, it would tend to build up the diminishing power and prestige of the Army.

I admit that these assertions cannot be mathematically proved, but human nature, it is well known, often shows its resentment at outside interference by becoming more than ever intransigent, by embracing the very thing which annoyed the outsider. The people who claim that such an embargo would diminish or even put an end to militarism in Japan are generally Americans who live or have lived in China and can hardly see conditions in Japan as well as we can see them here.

Many American business-men living in China see the dangers to them and to China in irritating Japan. On the other hand, Americans living in Japan see the reverse of the picture. They write of the gradual growth of the power of the admirable civilian groups in the Government as the people are more and more out of sympathy with the Army and they pray that America may not be the nation to destroy the good which is being accomplished in a multitude of ways.

Personally, I should prefer to rely on the well-nigh unanimous opinion of observers in Japan as to the probable effect of this or that measure on the Japanese, exactly as I should rely on the opinions of observers living in China as to what might happen to the Chinese. Far more Americans than you think get their ideas as to what is happening in the Orient entirely from missionary sources. Far be it from me to say anything against that admirable company of evangelists—except when they set up as advisers on political questions.

The pro-Japanese attitude of most of the American missionaries in Japan is as unthinking as is the pro-Chinese attitude of the missionaries in China. And, don't forget that we send several times as many missionaries to China as we do to Japan, that their influence on American thought is consequently far more widespread.

If what I have said is true, as I believe it to be, you will surely see that drastic action by us against Japan would not increase the chance that China might go forward as a free and democratic nation. Chiang Kai-shek is no bolshevik because he believes too firmly in the right of private property—he is a rich man himself, as his wife is a rich woman. But he is at present bound to the Soviet which has furnished him his war supplies and, after his kidnapping, must have forced him to make a virtual alliance with Moscow. True, he would break that alliance if it served his purpose, since the Chinese have little respect for contracts.

As I look back over my years in the Department of State I find a large part of our troubles came from the Chinese. Chiang Kai-shek would not break his agreement with the Soviet merely in order to set China on the high road of progress, although most of you believe just this because you have long been subjected to the most intense and the most effective propaganda with which the United States has been deluged in years.

Let me give you, in this connection, a few facts from which you can draw your own conclusions. The mass of Chinese detest foreigners of all kinds. Except for the few exceptions, a large part of whom we know, they have not acquired, even superficially, the habits and customs of the West (I might say, parenthetically, that I see no possible reason why they should if they do not want to, since their civilization is far older than ours, but as they have not I resent the calm way in which people assume that they have).

The Chinese are not a clean people, as any one who has traveled in China will admit. Their houses and their towns are too often filthy. They have no interest in sanitation and even the mission hospitals have taught them little. Their cruelty and utter lack of care so far as children are concerned are proverbial—but are pushed out of sight just now. They have never built up a system of justice under which foreigners can live. In business dealings, with foreigners at least, they are thoroughly dishonest. Again, any one who has lived in China will tell you that it is never safe to make an agreement without guarantors that the contract will be filled. Of course, there are exceptions. I have many excellent Chinese friends whom I both like and respect.

The Japanese, on the other hand, although reserved and sometimes suspicious of foreigners, and almost never as charming to meet as are the Chinese, have great admiration for foreign ways and seek to emulate them, have already built many Western cities and have adopted Western methods and Western clothes (The fact that they were altogether too apt pupils is one of the main reasons why the world has turned against them).

The Japanese are the cleanest people in the world, with the possible exception of the Americans. Everybody bathes daily and houses and cities are scrubbed. They are among the most progressive people in matters of public health, in hygiene, in sanitation. In Manchoukuo, they are training hundreds of doctors, nurses, and public health officials to fight the scourge of contagious diseases which have periodically decimated China. Japanese children are wonderfully cared for and are loved by their families as are American children.

Japan many years ago forced us and the rest to give up extraterritoriality by developing such an excellent system of justice that foreigners might expect to be treated as fairly as the Japanese themselves. All stories to the contrary—and you never hear such stories from American businessmen in Japan—the Japanese are a splendidly honest people. Of course, there are exceptions to this picture also. There are undoubtedly dirty and dishonest men in Japan as well as elsewhere, and even children with heartless families.

And another significant fact, Japan wrested Manchuria from Chinese control, even though we must admit that the connection was always fairly tenuous. Manchuria was a huge land overrun by bandits, with immense resources largely undeveloped, with a population living from hand to mouth and always fearful of losing what little it had to the rapacity of the bandits or of the super-bandit who was war-lord of the region.

In a few years of quasi-independence under Japanese tutelage, Manchuria has gone a long way on the road toward prosperity and security. The bandits have been almost entirely destroyed or driven under cover. The population has been increased by hundreds of thousands of Chinese who have crossed the border from China to this land of comparative safety. The cities have been cleaned up. A great new medical school has been built where Koreans and Manchurians are being trained to go out and fight disease, to teach people how to live.

Even with the United States, which has never recognized the new state, trade has more than trebled since the war-lord was driven out. I wonder how many of the inhabitants of Manchoukuo would willingly exchange the conditions of the present for those of the past. After all, these things are facts and seem to me more important than any propaganda. At least we should think about them, not dismiss them because they fail to be exciting.

Now a word about what I called the dangers of an embargo. It would not cause Japan to declare war on the United States. Although an embargo is practically a war measure Japan cannot afford to go to war with us and, above all, does not want to go to war with us. Japan wants us as a friend. But, this does not mean that we should necessarily refrain from going to war with Japan. If wild men in or out of the Japanese Army, in retaliation for what they would consider an unforgivable insult, should destroy American ships and therewith American lives, or American lives and property in Japan, or intentionally in China, there would be serious danger that we might go to war without waiting for any Japanese declaration. And this is all the more likely since the various committees organized ostensibly for the relief of China, but judging from their activities primarily for propaganda against Japan, have created already in this country an intense anti-Japanese sentiment which might easily burst into flame.

Of what use to China would be an American-Japanese war? An embargo, leading toward war, and certainly war itself, would instantly result in the absolute closing by Japan of the Chinese ports. Communication between China and the Western World would be practically at an end. We could do nothing to prevent this. Behind the wall of silence which would follow the closing of the ports Japan and Soviet Russia would settle their spheres of influence, and when eventually the ports were again opened there would be no longer any independent China to be aided or protected.

To attack Japan in her own waters, so I am told by navy men, we should have to double the size of our fleet. I might say, parenthetically, that that was a point which Japan could never grasp during all the endless discussions that went on here, in Geneva, and in London about naval ratios. The United States, in asking for a 5-3 ratio, never thought of dominating Japan but, as we have two coasts to defend, wanted to be on a par. All this means that a war with Japan would be horribly expensive and long drawn out. And at the end what good would it have done? That is a question each can answer as he sees fit. The only sure thing would be that China, for which the war would have been fought, would no longer exist as an independent nation.

The supreme danger of drastic action on our part, it seems to me, is that it would in all probability drive Japan into the arms of the totalitarian powers. This is a danger recognized by all, apparently, except violent anti-Japanese propagandists. It is a danger keenly recognized by England and France, by all Americans living in Japan and by some in China. It is quite clearly recognized by our own Department of State. Aside from the proponents of the idea in this country, the only people eager to have us declare an embargo against Japan are the Germans.

Only a few weeks ago an American who has lived for years in Germany and was here merely on a business trip said: "The German Government is eagerly anticipating American action against Japan in the form of an embargo. Why do you keep them waiting?" Of course, the Germans understand clearly what it would mean to have Japan definitely on their side. The immediate result would be the loss of Hongkong and Singapore to Britain unless the British fleet were divided, part going to the Far East.

And if this were done, what would happen in Europe? Not being a member of the American Government I can say freely that I want the Allies to win this war and that I deeply resent any action which will assist their enemies. You can say if you will: "An embargo on Japan will not produce this effect." I cannot prove that it would, but neither can any one prove that it would not—and the people who have studied the situation most earnestly consider the danger great.

This is no time to be trying experiments in international affairs. It is no time for an emotional approach to the great issues of the day. We must think things through. We must refuse to be stampeded by propaganda into action, the result of which we cannot foresee. We must not jump to conclusions and then express those conclusions in a manner which will be sure to irritate and may also tie our hands for the future.

Take, for example, the case of the Wang Ching-wei Government, inaugurated in Nanking. There was no reason in the world for the Department of State immediately to issue a sharp statement denying recognition. Of course, the American Government was right in not according recognition. We have long since recognized the Chiang Kai-shek Government and it would not only be most unfriendly, but contrary to international law, to withdraw recognition while that Government is supported by a substantial part of the Chinese people.

But, remember that there is no great national feeling in China, the majority of the Chinese people being only locally patriotic. What these people want is peace and security and enough to live on. They have not idealized Chiang Kai-shek as we have in America; a better chance to secure these benefits under Wang, they will drop Chiang Kai-shek without a word of regret. If Wang, who, after all, has had a distinguished career and is a fine and progressive man, should prove himself a mere puppet, should prove that, like any other war-lord, he is thinking only of himself, his Government will not last and we shall be glad we did not recognize him.

Remember, however, that he is now the ruler over vast areas, including the richest parts of China. If his Government should be initially successful, if Japanese troops are gradually withdrawn, if a new peace and prosperity dawns in the Yangtze valley, the Chinese will rally to Nanking in such numbers that it will be the Government of China, no matter how much we growl about it.

Yet already most of you have decided to despise the Government of Wang Ching-wei. Why? Because the headlines in the press call it a puppet government. You accept the phrase without any attempt at analysis of the meaning. You hear it said that Wang Ching-wei is a traitor. But, what is your definition of the word "traitor?" If a citizen of a country believes profoundly that the head of the state is leading it to ruin, is he necessarily a traitor if he tries to change the head of the state?

The Republicans and certain Democrats, I understand, are dissatisfied with the present conduct of the American state and are shortly going to try to replace Mr. Roosevelt. It would be pretty drastic to call them all traitors. Even when there is a revolution, and that has not happened this year in China, we must be cynical enough to admit that those who win are generally considered as the patriots and those who lose are often called traitors. Wang Ching-wei hates communism and believes Chiang Kai-shek to be dominated by the Soviet. He did not break with him until after the kindnapping episode. He believes that it would be better for China to come to terms with Japan than to become a state under the direction of Moscow.

This does not mean that he is a traitor, nor does it necessarily mean that he has sold out to Japan, as the propaganda phrase goes. In fact, it looks as though Wang might have driven a hard bargain with the Japanese. If he had been amendable he would have been installed long ago. We are unrealistic, as the Department of State was in its sharp refusal to recognize the new Government, when we judge the Orient by Western standards.

As time passes we may have to revise our ideas and the American Government may have to eat its words. I should like to see a wholly independent China, but if the country must be under a foreign influence, I, as an American, should prefer Tokyo to Moscow. At the moment that seems to be the alternative.

Many of you will say that in all this I am pro-Japanese. This is not true. I am trying to look at the picture solely as an American, thinking only of what may be the best for this country. I do not want to see the Government of the United States become an international busybody.

We can do more for the world through friendliness than through condemnation. We can and should give of our money and our time and our effort to help the suffering Chinese. But, this does not mean that we must ignore the faults of the Chinese and paint the Japanese blacker than the truth. We have to admit that Japan, with all its faults and militance and over-confidence, is the most progressive nation in the Far East, that it is bound to play a great part in the future of the world.

We can influence Japan along the lines which we believe to be important and right only through understanding friendship. We must try now, therefore, to assist the forces of peace and good-will. We must not play into the hands of the military, must not give them a chance to say, when the war is over:

"We could have won hands down, except that the United States interfered." This would not be true even if we should vote an embargo, but it would be plausible and it would turn the entire Japanese nation against us. Let us not be punitive but, rather, constructive. That is the best interpretation of our Christianity.

Coal Liquefaction and the South Manchuria Railway Company

"A DROP of oil is a drop of blood." This is an appropriate axiom in modern times when oil plays such an important indispensable part in national defence. It was a little more than thirty years ago that the South Manchuria Railway Company (hereafter referred to as S.M.R.) was established as Japan's lifeline in the continent, but during the years that have gone by, the Company, besides its main railway enterprise, mobilized all of its multifarious departments in assisting the realization of the national policy. It is practically impossible to enumerate all the achievements of the S.M.R., but among the more important ones must be included the completion of a 10,000 kilometer railway system, the management of 15,000 kilometers of bus lines, the phenomenal development of the city of Fushun known for its famous collieries, the establishment of the Showa Steel Works at Anshan now under the management of the Manchuria Heavy Industry Development Corporation through transfer, the oil shale enterprise at the Fushun Collieries which upon completion of the first and second stage programs will be able to produce a considerable amount of oil within the next four or five years, and a host of others. With expansion projects going on so rapidly, the Fushun shale oil plant has now reached the stage where it can produce annually as much oil as Japan and Karafuto produce, while at the end of four or five years the output of Fushun will become twice as much. Moreover, coal liquefaction was begun recently at the Fushun Collieries of the S.M.R. This new enterprise which employs the direct liquefaction (hydrogenation) method, has made such a wonderful progress within a relatively short time that the coal liquefaction industry of the S.M.R., has now overtaken Germany which was famous for this type of industry and has caused a world-wide sensation among the oil industry circles.

The successful discovery of the coal liquefaction process is the first of its kind in Japan, a success which Japan can well be proud of, but the untold efforts and trying experiences of those responsible for the success both directly or indirectly and the invaluable encouragement given by the military and naval officials have contributed toward the making of this great discovery.

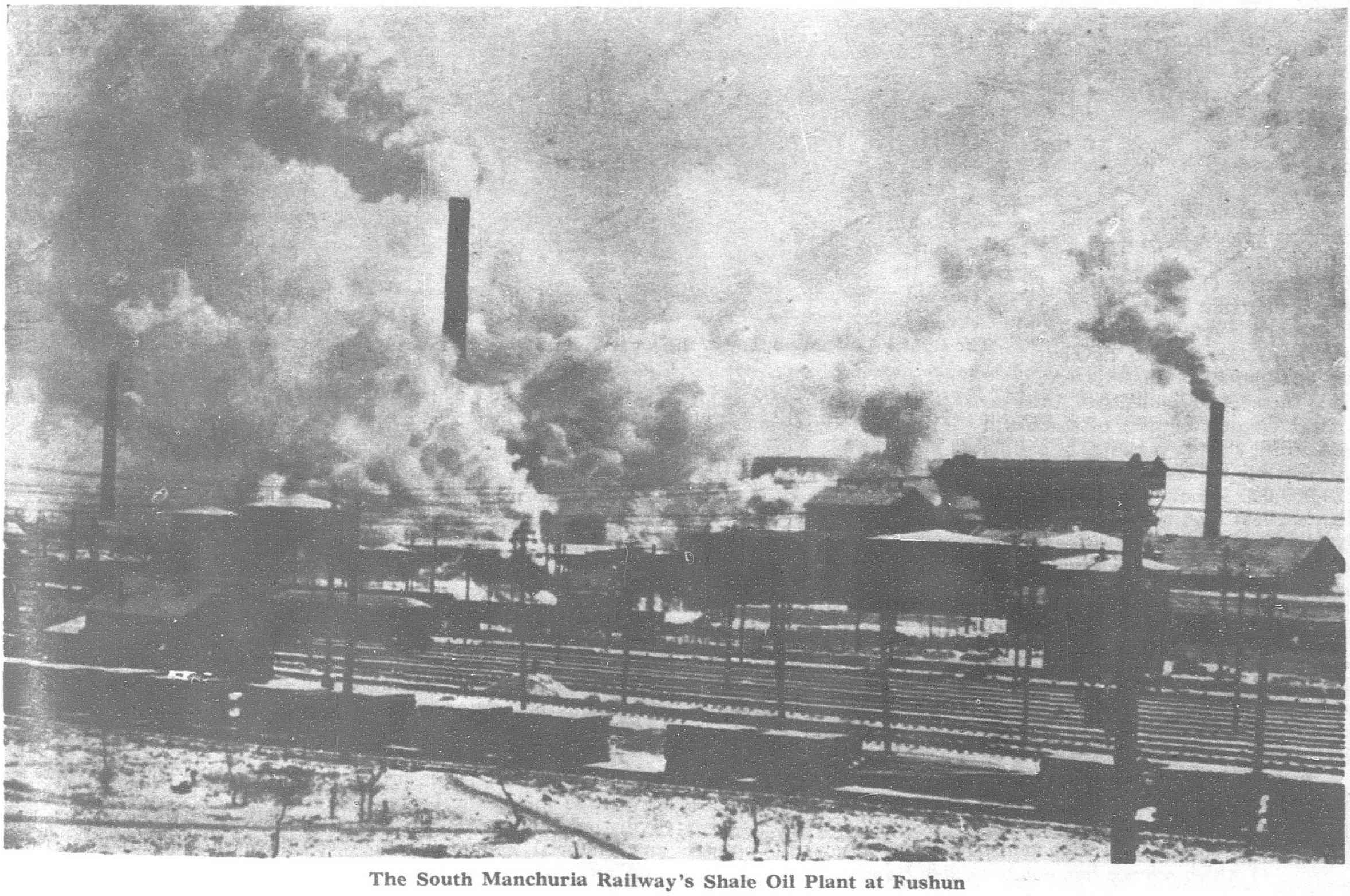
The present output of oil in the areas under Japanese control or influence amounts only to about 600,000 metric tons annually (including natural oil and shale oil produced by the S.M.R.). In contrast to this situation, the civilian demand alone for oil in Japan was 2,900,000 tons in 1935. Adding the need of the fighting forces the total demand for oil will easily reach 10,000,000 metric tons annually. Such being the case, the question of attaining self-sufficiency in fuel oil through the execution of a well worked out policy became all the more important. At the present time, the liquid fuel policy aims at:

(1) Development of oil fields and shale oil extraction
(2) Utilization of natural gas
(3) Alcolization of starches and carbohydrates
(4) Encouragement of coal liquefaction

Of the above, coal liquefaction is the most promising due to the abundance and extensive distribution of coal supply and the relatively high degree of research and experimentation completed in this line.

Importance of Coal Liquefaction

The danger of a world-wide petroleum shortage is one reason why coal liquefaction is being given so much publicity as a new rising industry. With aircraft, automobiles and Diesel engines making such phenomenal progress in recent years, the problem of whether or not the oil fields of the world would be able to keep up with the ever increasing demand naturally arose. As the following figures show, the oil resources in America alone which controls one-half of all oil fields in the world are estimated to last only fifteen years more while the oil fields of the entire world would become bone dry within eighteen years at the most according to a pessimistic estimate.

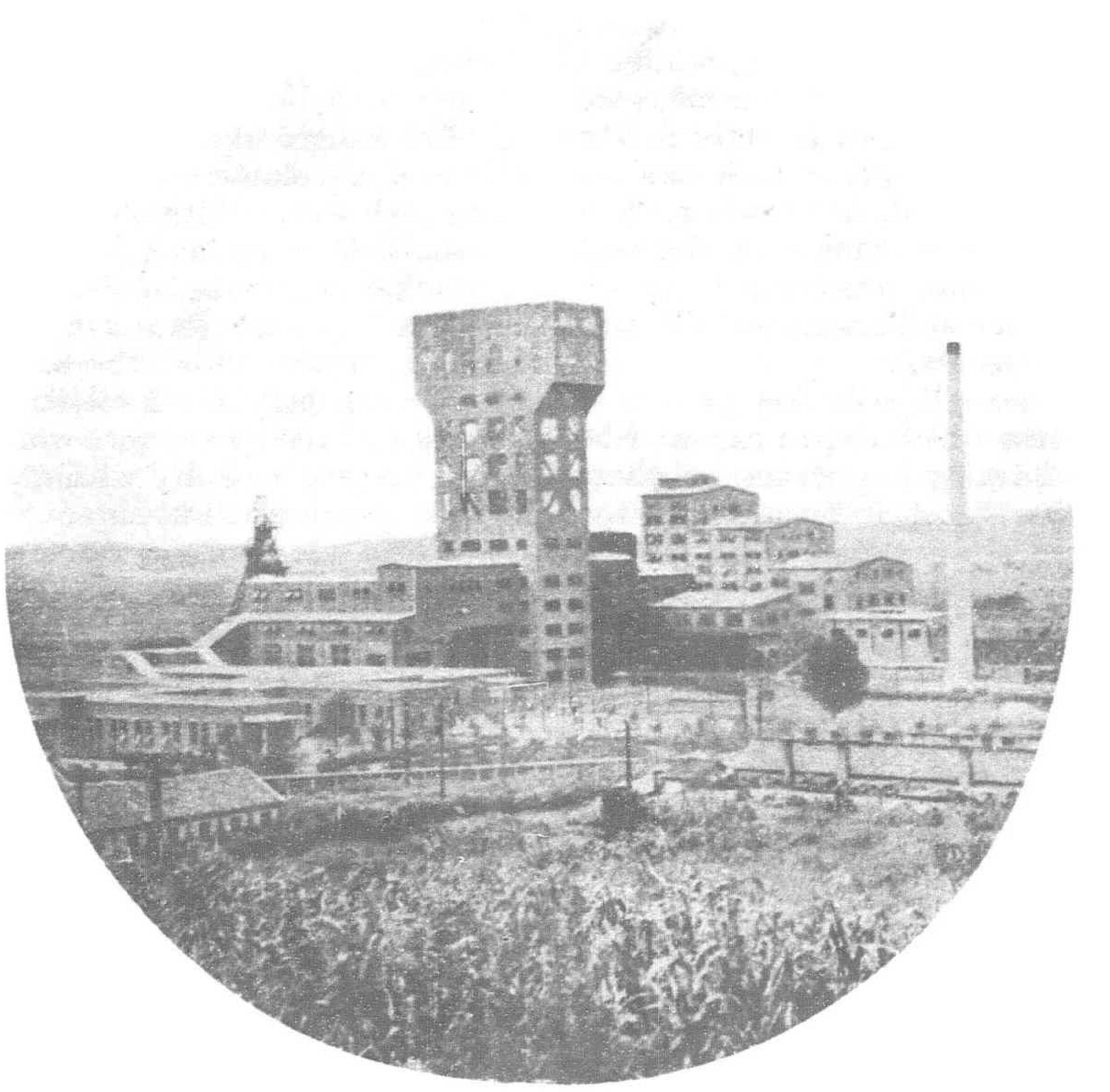


The South Manchuria Railway's Shale Oil Plant at Fushun

Country	*Estimated Total Resources in Jan., 1936 (in 1,000 metric tons)*	*Percentage to World's Total Resources*	*Total produced up to the end of 1935*	*Remaining Span of Life*
United States	2,029,283	49.91%	2,410,157 m.t.	15 years
Soviet Russia	550,685	13.54	471,038	22
Total for the World ..	4,066,000	100.00	3,756,912	18

The above table is based on the most reliable figures but since there are many parts of the world where oil might be found and where investigations are yet to be made, and the life of oil fields can be lengthened if improvements in drilling methods are made, a certain degree of optimism is permissible, but even the maximum allowance given by the most optimistic estimates hold that 70 years are perhaps the maximum. At any rate, we must accept the foregone conclusion that oil resources will be depleted within a century at the least. This situation has given rise to the question of to-morrow's oil and to the birth of the slogan " He who controls oil will control the world." It is not difficult then to comprehend the disadvantage at which the countries without oil resources, Japan, Germany and Italy, are placed in comparison to the comfortable position in which the United States, Great Britain and Soviet Russia which control the world's oil resources find themselves.

Another reason why coal liquefaction is important is the prospective future which this industry has in store, a question which the reason given in the foregoing paragraph will eventually solve.



The Ryuho Shaft Mine, one of the largest of its kind in the world

Direct Liquefaction Method

On July 22, 1939, the S.M.R. and the Ministry of the Navy simultaneously announced the successful discovery of the direct liquefaction process and caused no little wonderment among the oil industrialists of the world. Up to this time, practically all important Japanese chemical industries such as ammonium sulphate and rayon were industrializations of existing foreign patents, but the coal liquefaction process at Fushun was industrialized after it was discovered in a Japanese scientific laboratory. It is said that the surprise of the Germans at the success of the process was greater than that of the Japanese themselves even though Germany was the first to develop the coal liquefaction industry, while there is no doubt that Americans, British and Russians who control the greater part of the world's oil output were somewhat astonished, though perhaps, in a different sense. Just recently the I.G. coal liquefaction patent of Germany which was priced at Y20,000,000 is now offered at a few million yen. There is more than a guess that the discovery of the S.M.R. process has caused the devaluation of the German process. The German process of coal liquefaction uses lignitic coal for raw material but the new process at Fushun employs bituminous coal for the extraction of gasoline and other volatile oils which are of exceedingly high quality. Furthermore, the Fushun process was perfected after only six months of experimentation whereas the Billingham plant in England spent two years before the production stage was reached. Since there is plenty of bituminous coal in Karafuto, Hokkaido, Japan proper, Manchuria and 200,000,000,000 metric tons in North China alone, there is no fear of raw materials running short.

In regard to the difficulties encountered in the application of this process, it is best to borrow the words of Dr. Abe who has appropriately summarized as follows:

(1) The contrasting of chemical reactions of coal the nature of which science has not been able to explain as yet.

(2) The liquefaction of coal which is a solid, of oil, a liquid, and of hydrogen, a gas continually at the same time, and the necessity of maintaining a high pressure of 200 and a high temperature of 400 degrees Centigrade.

(3) The danger of coal turning to coke when not liquefied.

In short, the process seeks to obtain oil by making coal and hydrogen react chemically by a catalyser of from one to two per cent but the difficulties experienced in employing this process both chemically and mechanically are far greater than those encountered in other industries using high temperature and pressure.

Several years more and further technical experimentation, however, are still necessary before the liquefaction industry which has just passed through the experimentation stage can be developed economically. For obvious reasons, government protection must be given to safeguard the healthy growth of the new industry as it is being done in Germany where a high tariff barrier is in force. Government aid is also given in Japan. The Artificial Petroleum Manufacturing Industry Law and the Law Governing the Fuel Industry Development Company were promulgated, the former on August 9, 1937. Both laws guarantee dividends for a period of ten years on civilian shares.

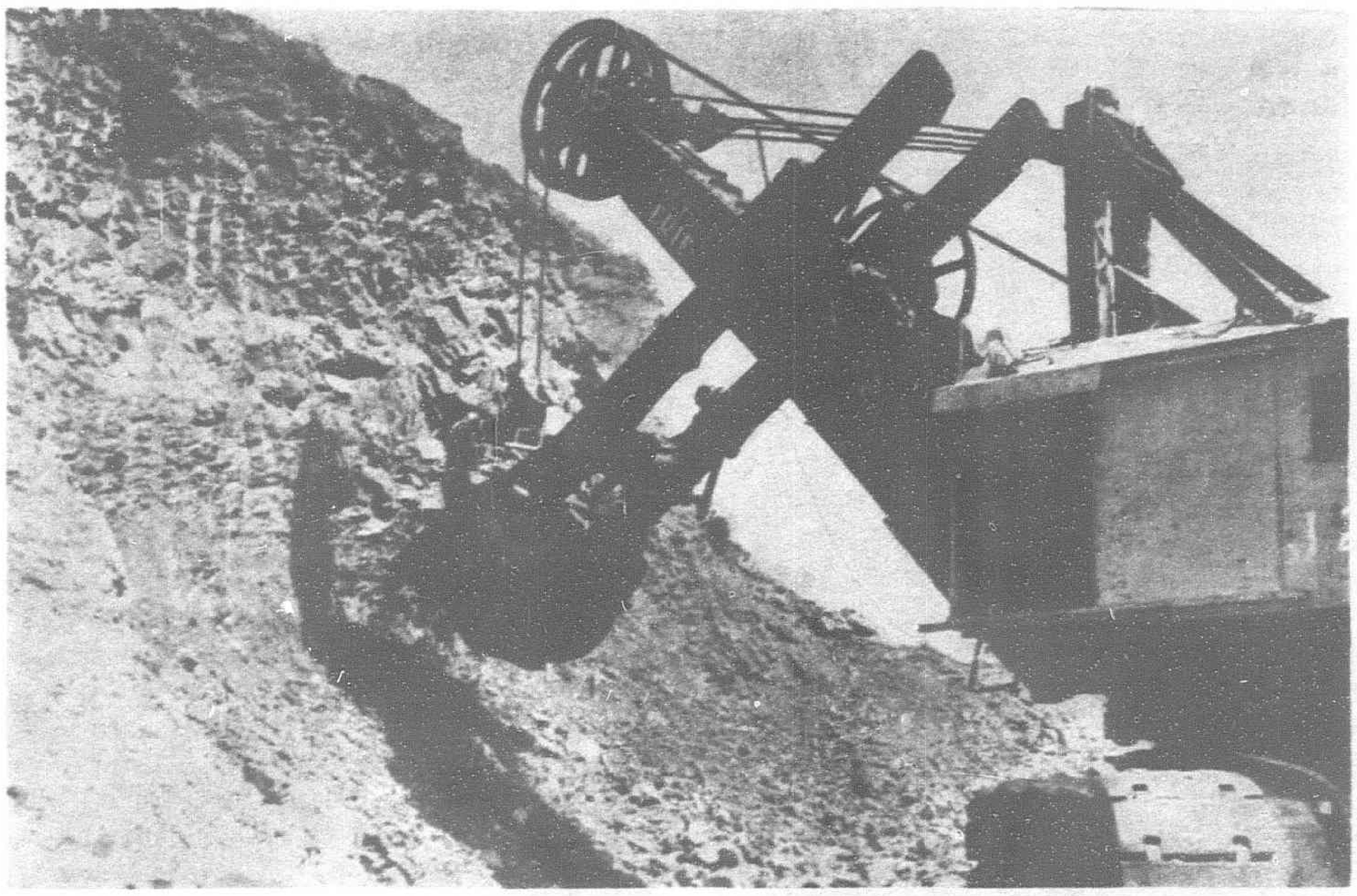
To-day the oil problem is an important problem not only in the sense of national defence but also from the standpoint of national existence. Great Britain, the United States and Russia control the oil supply of the world. The problem is more serious when the possibility of these three oil-controlling countries becoming Japan's enemies is given careful consideration although no one enjoys considering such possibilities. Without oil, our army and navy air crops which have given a remarkable account of themselves cannot continue to give such indispensable service. If the Japanese nation is to make further progress, the most promising way out of the difficulty is the perfection of the artificial petroleum manufacturing industry.

Industrialization of Coal Liquefaction at Fushun

The coal liquefaction undertaking of the S.M.R. had its beginning in 1928 when the President Jotaro Yamamoto made a request to the Tokuyama Naval Fuel Station for experiments on the proposed undertaking. The experiments conducted by the Station became indispensable contributions to the inauguration of the new enterprise, while technical experiments conducted by the Central Research Laboratory of the S.M.R. were coupled with the findings of the Navy in the formulation of a fundamental policy. Then in August, 1936, an office to direct the contruction of a coal liquefaction plant was established at the Fushun Collieries under instructions of Mr. Yosuke Matsuoka who was then the President of the S.M.R., while in 1937, the new undertaking was incorporated into the Five-Year Industrial Plan of Manchoukuo. After various obstacles were overcome, the plant was finally completed in February (1939).

Upon completion of further experiments, it was found that the quality of oil produced was exceedingly high.

Up to this time the production of artificial petroleum was regarded as a difficult technique. The application of the German hydrogenation process in which German lignitic coal is used as raw material, cannot be regarded as exactly difficult in this day and age, but when Japanese or Manchurian lignitic coal which



Giant electric shovel at work in Manchuria Coal Fields

is somewhat different in nature from the German type is used, tremendous difficulty is experienced. Moreover, no process which uses bituminous coal like that found at Fushun has been discovered in Germany as yet.

It was in 1868 that Berthero of France first discovered that coal can be converted into oil through liquefaction. Based on this discovery, Professor Emil Fischer of Germany published his lectures on the reduction of coal in 1912, while in the following year Dr. Belgius, also a German, discovered that the greater part of coal can be converted into oil through hydrogenation through the application of high temperature and pressure.

From that time on, many countries such as Great Britain, the United States, Soviet Russia, Italy, Japan, etc., took up the study of coal liquefaction, the new chemical industry based on the Fischer process and the hydrogenation process of Dr. Belgius. Since all countries kept a veil of secrecy over the quality of their products, it is assumed that the figures of production given out are lacking accuracy and in a number of cases, figures are unavailable, but the best figures are:

(1)	Germany	380,000	metric tons
(2)	Great Britain	150,000	,, ,,
(3)	France	210,000	,, ,,
(4)	Italy	300,000	,, ,,
(5)	United States	500,000	,, ,,

The Shorben Plant of Germany which had aproductive capacity of 150,000 metric tons in 1936 and believed to have made no expansion since then is the only liquefaction plant that measures favorably with the Fushun plant of the S.M.R. It is said that the success or failure of coal liquefaction in Germany is not known as yet.

In Japan, the Navy has the longest history in experiments with coal liquefaction but the fact became openly known in 1926.

With the co-operation of the S.M.R. the Naval Fuel Station of Tokuyama completed experiments on coal liquefaction and laid the foundation for the construction of the Fushun Plant of the S.M.R. and a plant of the Chosen Nitrogen Company in Chosen.

The S.M.R. offered its generous assistance to the Imperial Navy in conducting experiments on coal liquefaction as a means to help carry out the policy of securing self-sufficiency in fuel, and on two occasions since 1926, it has contributed experiment funds to the Tokuyama Naval Fuel Station. At the same time, a laboratory exclusively for conducting experiments on coal liquefaction was created at the Central Research Laboratory of the S.M.R. where attempts to industrialize the results have been conducted. Based on the findings at this laboratory definite plans were adopted in 1935 by Mr. Matsuoka, former President of the S.M.R., and with the subsequent allotment of enterprise funds, construction of the Fushun Coal Liquefaction Plant was undertaken in 1936.

Besides the Fushun Plant, there are in Manchoukuo two other liquefaction plants, namely, at Ssupingkai and at Kirin, while the Mitsubishi Bussan Company which holds the patent rights of the Fischer process in Japan and Manchoukuo is planning to construct a plant using the German process at Chinchou. All of these plants are included in the Five-Year Industrial Plan of Manchoukuo which has already taken its first step toward the industrialization of coal liquefaction.

Fushun Coal Liquefaction Plant

Various experiments on coal liquefaction have produced no less than ten different processes, but only two, the Fischer and hydrogenation processes can be industrially utilized.

The hydrogenation or direct liquefaction process is a process whereby 90 per cent of the coal used is transformed into oil by applying hydrogen under high pressure and temperature and with the aid of a catalyser. In the Fischer process, oil is obtained by passing a gaseous mixture of carbon monoxide and hydrogen, the ratio of which is two to one, over a catalyser consisting of cobalt, copper, or others. The temperature is between 180 and 200 degrees, pressure between ordinary and seven atmospheric pressure. Approximately 140 cubic centimeters of oil is produced from a cubic meter of gas. The Fischer process is being used in various parts of Germany. A process which is similar to the Fischer process in principle yet different in itself is the synthetic process discovered by Professor Kita of the Kyoto Imperial University. This process will be industrialized soon. Another process different from both the Fischer and Kita processes is the synthetic process discovered by the Fuel Division of the Central Research Laboratory. This specific synthetic process synthesizes oil from gas under an atmospheric pressure of 200.

The low temperature dry distillation process is being studied with much interest as a means of supplying hydrogen gas, tar, and synthetic gas to the two coal liquefaction processes.

The Fushun coal liquefaction plant was begun in August, 1936, when government permit was granted. This plant was adapted to the Imperial Navy process at first but with the progress made at the Central Research Laboratory, appropriate expansion was carried out for the purpose of incorporating the new findings. The new changes include equipment and operation methods of the reaction and coal mixing plant which evolved from the experiments carried on over a number of years at the Central Research Laboratory and characterizes the Fushun Plant as one based on a unique process and on a number of S.M.R. patents. The Fushun Coal Liquefaction Plant is composed of the hydrogen manufacturing plant, compression plant, coal mixing plant, reaction plant, gas separation plant, and the distillation plant.

(1) The hydrogen manufacturing plant is composed of the liquid gas plant and the transforming plant where hydrogen is manufactured from steam by using coke.

(2) The compression plant compresses the transformed gas coming from the hydrogen plant, removes carbonic acid within the gas, and compresses hydrogen to the pressure required in coal liquefaction.

(3) The functions of the coal mixing plant consists of arranging coal for liquefaction use, making of catalysers and paste and sending them to the reaction plant.

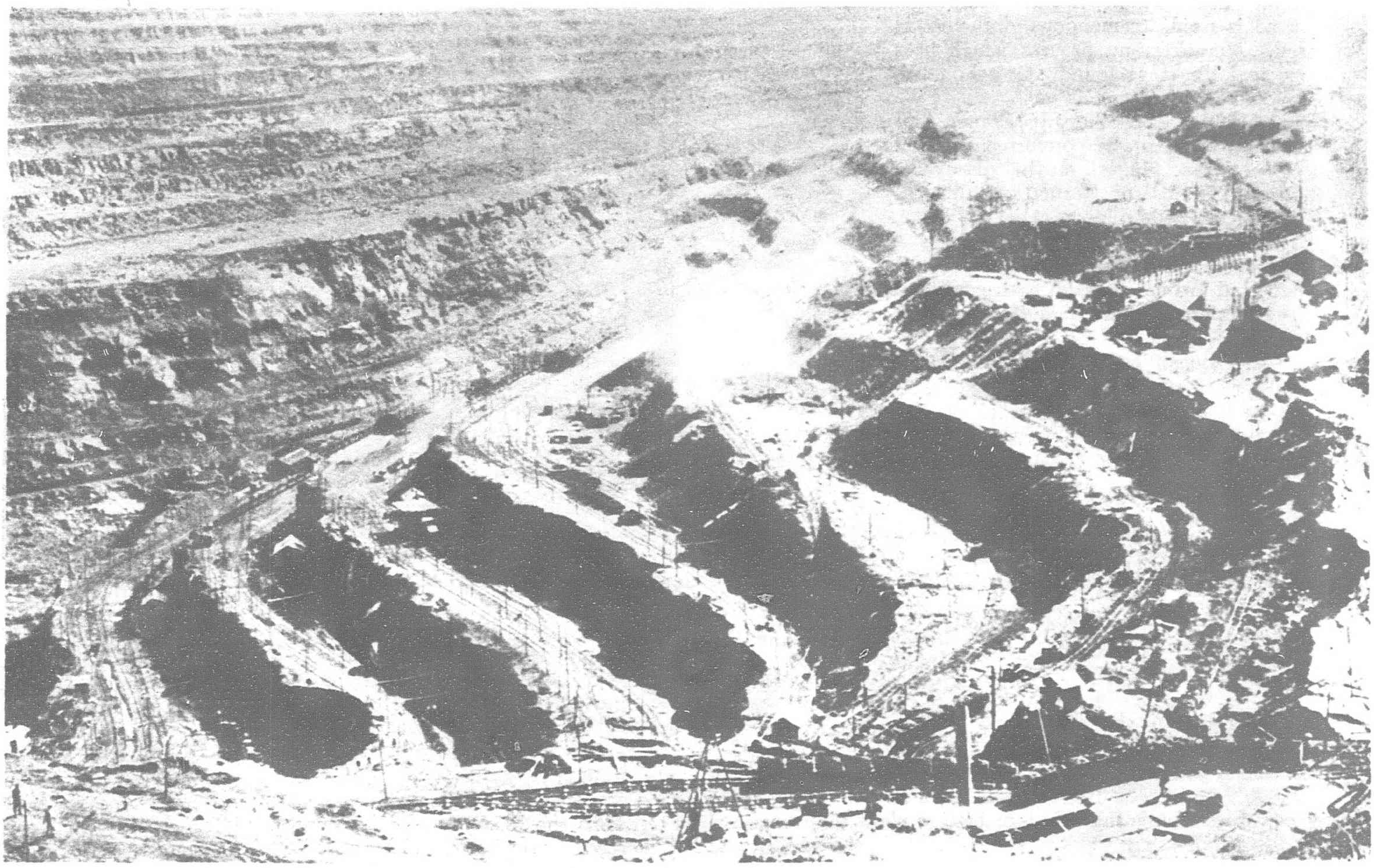
(4) The reaction plant turns the high pressure hydrogen and paste received from the coal mixing plant into oil.

(5) The gas separation plant disposes the discarded gases after liquefaction reaction and manufactures hydrogen from discarded gas to be used again in liquefaction.

(6) The distillation plant is composed of crude oil distillation plant, oil refining plant and the cresol plant.

Products of Coal Liquefaction

Gasoline.—Gasoline produced from coal liquefaction differs in no respect from gasoline produced from petroleum and can be mixed with each other freely, but the coal liquefaction gasoline



The Fushun Open-cut mine of the South Manchuria Railway's mammoth man-made valley of coal

possesses a higher octane value than that of petroleum gasoline. For use in ordinary engines, such as the automobile that run the streets, liquefaction gasoline is considered to be too good, so it must be diluted with a lower grade gasoline to obtain a more appropriate octane value. In recent years, the pressure of internal combustion engines has been increased tremendously and consequently, the demand for high octane value gasoline has increased. When a higher octane value gasoline which gives high pressure is used, fuel consumption can be economized. The higher the octane value of gasoline the more horse-power is developed. Such being the case, no anti-knock preparation is needed when using gasoline of 80 octane value. There is a strong possibility of producing gasoline with 100 octane value from coal. Herein lies another importance of coal liquefaction, the production of a high grade gasoline. It is reported that the gasoline produced by the S.M.R. at Fushun is of exceptionally high quality but further study and experiments are being conducted.

The Fischer gasoline obtained through the Fischer method needs no refining and is similar in quality and characteristics to gasoline produced from petroleum. The producers of this type of gasoline strongly claim that their product has an octane value of 73 but actually it is between 50 and 60.

Crude petroleum.—In the direct liquefaction process, sometimes only gasoline is obtained but crude petroleum produced by this method does not differ from natural petroleum. However, the former has the disadvantage of having a low cetane value which does not permit complete combustion. Therefore, crude petroleum produced from coal liquefaction cannot be used in high speed Diesel engines.

Crude petroleum produced through the Fischer process also known as Fischer Diesel oil is colorless and transparent and differs from Fischer gasoline only in density. General properties as Diesel oil are the same as those of petroleum Diesel oil. Its cetane value is relatively high and have given good results in low temperature tests. It is surmized that in the not distant future, Fischer Diesel oil, together with shale oil produced at Fushun will be improved to such an extent that they can be used for aircraft and submarine purposes.

Gas.—Gas produced through the direct liquefaction process gives off greater heat than other gases. For this reason, this gas can be used as a substitute for gasoline to cut down expenses, to achieve higher acceleration and for other purposes, but, on the other hand, bulky storages must be carried by vehicles, but these storages are too small for long distance operation.

In summarizing, coal liquefaction gives better gasoline than ordinary gasoline, is weak in crude petroleum, but the Fischer oil is superior to crude oil.

Eleven Years of the Coal Liquefaction

The Imperial Japanese Navy has the longest history for experimentation on coal liquefaction. It was in 1928 that the then President Jotaro Yamamoto of the S.M.R. asked the Tokuyama Naval Fuel Station authorities to conduct experiments on the industrialization of coal liquefaction as a means of solving the fuel problem of Japan.

Experiments on coal liquefaction were conducted for the first time by S.M.R. by Messrs. Inosuke Watanabe who was then the head of the S.M.R. Technological Institute and Ryonosuke Abe around 1928.

As a result of revisions within the Company, this experiment was transferred in 1931 to the Central Research Laboratory and the staff was increased.

In 1932, industrialization experiment were conducted by the Tokuyama Naval Fuel Station. About the same time, Dr. Shiba advised the S.M.R. to purchase equipment from Germany costing Y100,000 and for this purpose Dr. Abe was dispatched to Germany. This is the first coal liquefaction equipment obtained by Japan. The machinery was immediately installed at the Central Research Laboratory and experiments were conducted during 1933 and 1934. On the other hand, the experiments which were being conducted by the Navy proved the possibility of industrializing coal liquefaction. As a result, the Coal Liquefaction Committee headed by Director Yamanishi was formed. The committee having decided to industrialize coal liquefaction and to construct a

(Continued on page 254)

Manchoukuo: Hunters' Paradise

By TARO ITODA

(Continued from June issue)

PRAIRIE chicken and partridges are principally found in the steppes of Barga though they are fairly common in the Sungari basin to the west of Harbin. Partridges are also caught in large numbers by the natives with a special kind of net.

In spring and autumn all the meadows and marshy grounds are thick with snipe, so much so that when they take to the air they simply blank out the sun and the average sportsman can easily bag a couple of hundred in a day.

Sables are still found in large numbers, but less than half of what they used to be some 20 years ago, in the majestic virginal forests of the Little Hsingan range and those of the Chang-pai-shan. Sables are hunted in two methods: with traps and nets. The natives stretch the net across the mouth of the hole and then chase the animal out of its den.

The best fur-bearing sable is found in the neighborhood of Sansin, coming from the Little Hsingan range. The fur of the sable fetches a fair price in the market.

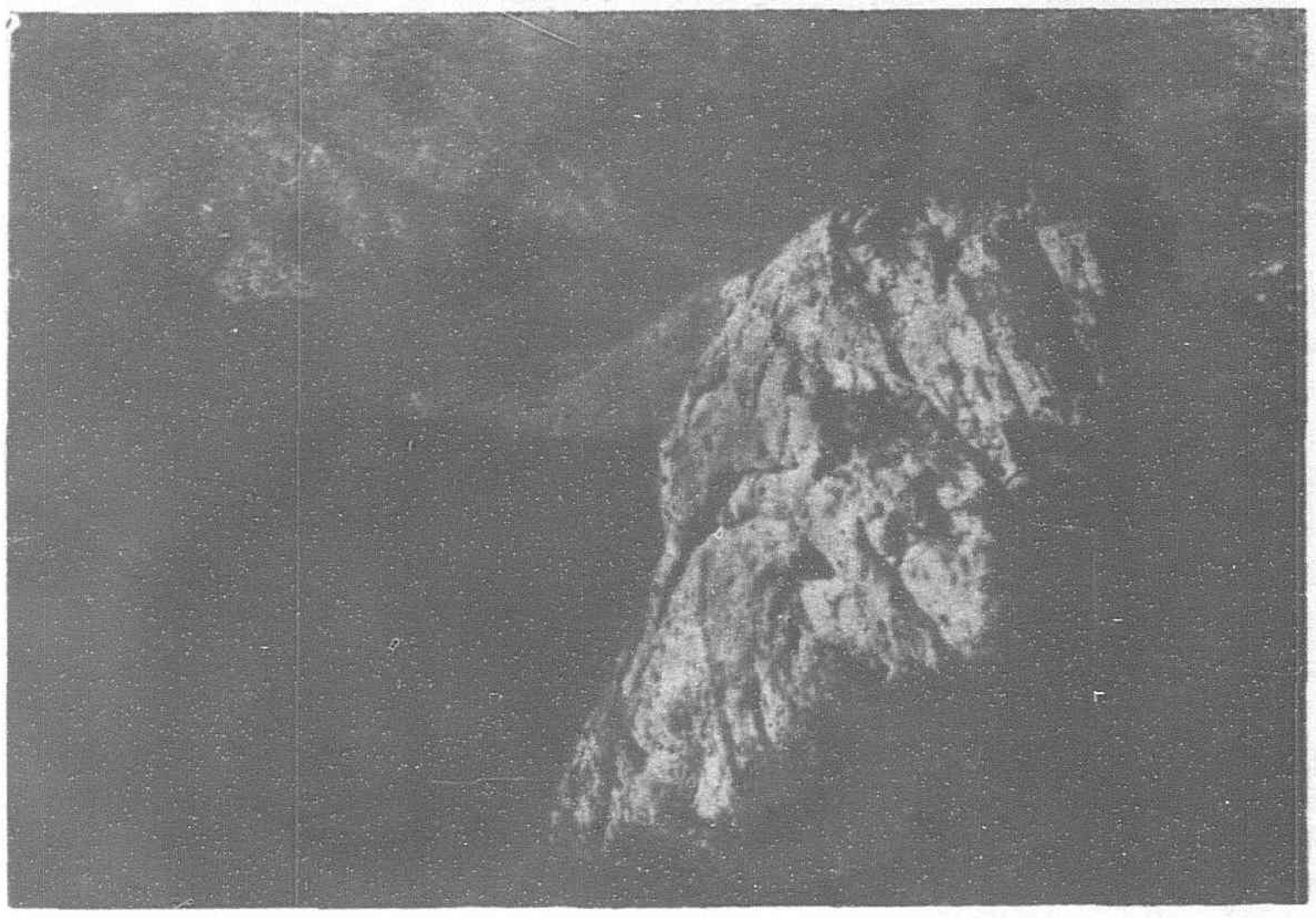
Squirrels are plentiful in the woods and are either trapped or shot with guns of small calibre. Besides the native species of Barga one occasionally meets the Transbaikal squirrel in Hsingan province. They migrate to this region when there is a nut famine in their own homeland. The fur of the Transbaikal squirrel is priced higher than that of the domestic one.

The Siberian weasel is found all over the country and is mainly trapped. Its fur is exported and Chinese writing and painting brushes are made from the hair of its tail.

The polecat is found everywhere and is trapped.

The marmot or prairie-dog is the native of the sandy wastes of Barga. In spring and autumn it is caught by being excavated from its burrow or is shot.

The autumn shooting season for marmot commences from the end of August and lasts to the middle of October and the spring season runs from the middle of May to August. Every hunting season finds more than 200 hunters engaged in this pursuit and it is one of the most profitable and safest of all forms of hunting in Manchuria.



The precipitious peak of Mount Kaoli. The higher peak rising behind is Mayunling (cloud scraper). The scene is not far from the Mukden-Antung Railway

In 1918 the total number of pelts of the prairie dog shipped from the Barga district by rail was 7,989,000 but in 1922 the total decreased to 1,363,000. This sudden and enormous drop in rail shipments is accounted for by the creation of an overland cart-transportation system from Barga to Tientsin through Kalgan and restrictions placed on hunting the prairie dog. In that year (1922) about one million pelts were shipped by cart to Tientsin.

Notwithstanding the fact that hunting of the prairie dog was prohibited, it was surreptitiously carried on by both Chinese and Russian hunters and the agents of the foreign fur buying firms openly bought such poached skins at ridiculously cheap prices.

In August, 1925, the ban on prairie dogs was repealed and with its repeal the number of hunters engaged soared from 200 to 3,000, the latter number at present being engaged in the pursuit.

It is important to take good note of the following fact in hunting the marmot. As the hunter enters deeper among the sand dunes of the steppe, he must first make sure there is no stray dog far from its burrow-grounds, because such wandering dog is certain to be contaminated with sickness. It has been established by medical authorities that all bubonic plague epidemics with which this country is occasionally afflicted originate from such sickly prairie dogs. Such infected animals are therefore avoided by the hunter or if accidentally killed it is left unskinned. It is well known among prairie dog hunters all such sick dogs leave their burrows and colonies and go into self-imposed isolation until wholly recovered. The eyes of a stricken dog are milk-white.

The otter makes its home mainly along the banks of rivers and streams and is shot by a self-actuated bow or caught in a running noose. In the winter hunting season it is almost always killed near the water holes made on the frozen rivers. Its color is chestnut brown with a little mixture of grey. Its pelt is highly valued in the fur market.

The ermine is found in a few places in this country. It is one of the most highly priced furs. In winter it is white with the sole exception of the black tip of the tail.

The lynx frequents the Little Hsingan range as well as the Kirin forests, but is very rarely found in the Great Hsingans. Its color is light-grey with spots and the hair on the eartips is black.

The fox is found in Manchuria in several varieties and the value of its fur varies according to its quality. In the Sansin district the color of the fox is black-brown; the Siberian crossed fox is red; in the Shihe district, white. It is caught with traps or poisoned bait and also shot.

Raccoon is found in the Kirin forests as well as in the Great and Little Hsingans. It is caught by excavating it from its burrow. Its fur is exported.

Badger is found throughout the country and it is excavated from its burrow.

In the steppes of Barga and in the Great Hsingan range the big grey Siberian wolf is found and in the Little Hsingan range and in the forests of Kirin province, smaller and red wolf. Wolves are caught by poisoned bait or with the rifle and the skins are exported.

The Himalayan marten is found in the forests of Kirin province and in the Little Hsingan range. Its rough fur has little commercial value. It is mainly trapped.

Corsac fox is found in Mongolia and in the steppes of Hulunbuir (Barga). It is hunted with dogs by the Mongols or shot by rifle by the nomads of the Hsingan provinces.

Wildcat is found in the forests of the Kirin province.

Domesticated dogs of better breeds having fine coats as well as the native mongrels also possessing a good coat have also become a source of commercial traffic due to the great demand for dog skins from abroad. Milady's pet or my lord's hunting dog of single color are the ones most in demand and most frequently disappear. It is claimed that dog fur withstands chemical processing in making imitations of other higher priced furs.

The leopard is not found in very large numbers in Manchuria and is confined to the Little Hsingans and the vast unexplored forests of Kirin province. It is hunted with guns and dogs.

Meat furnishing animals are the elk, moose, mountain goat, wild goat, boar, Mongolian antelope, spotted stag, tiger, musk and bear.

Methods of catching or killing the meat-furnishing animals are divided into two main categories: trapping and shooting with rifles. All the hoofed animals are either caught in the pit-traps or shot with guns and the savage clawed ones are killed with rifles, poisoned bait and dynamited bait.

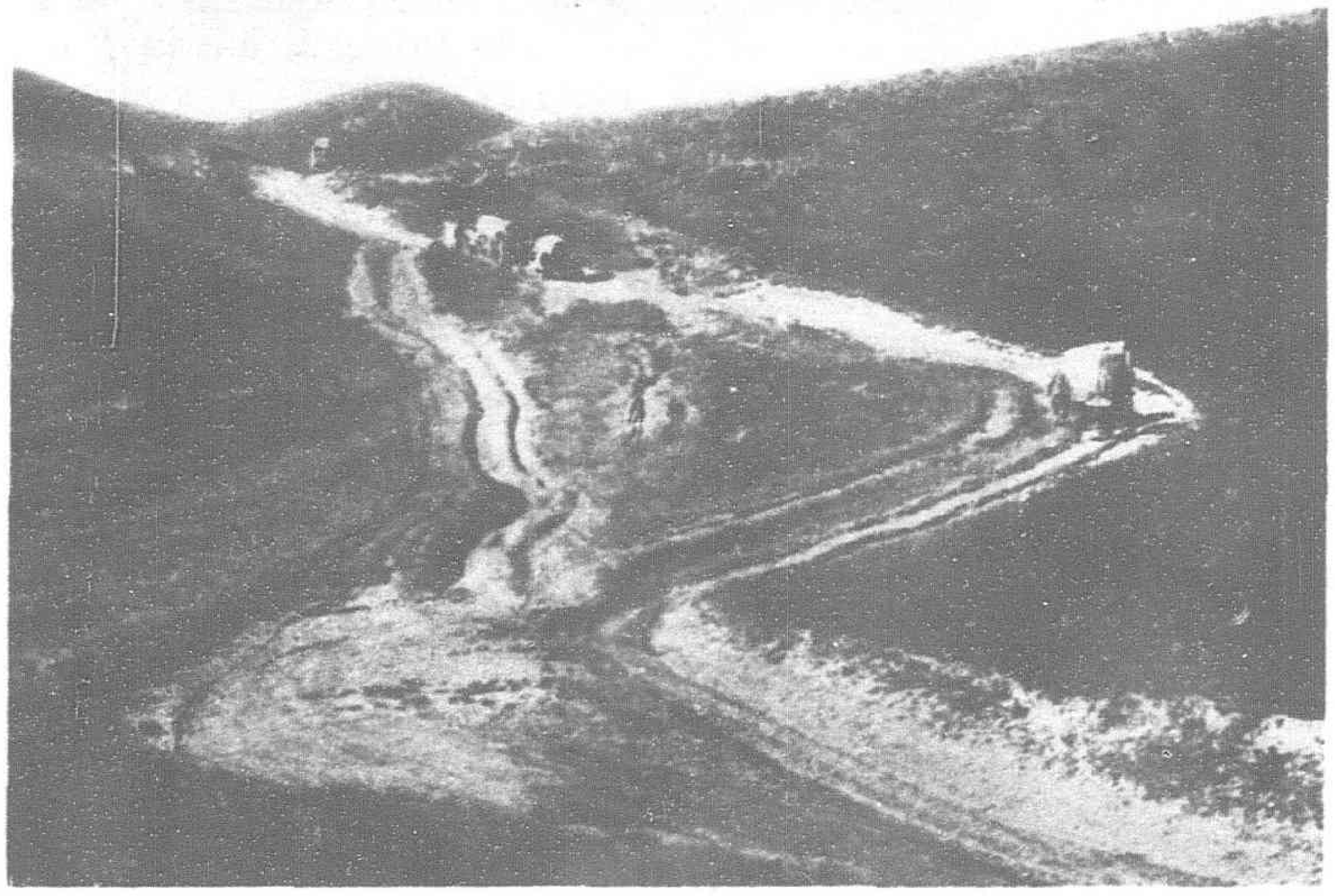
Of all the wild animals commercially hunted the most important is the elk. It is hunted by various methods, primarily for the special products which it yields, such as the young horns, meat, skin, antlers, fat and unborn elk. The best season in which to get the young horn, extensively used for medicinal purposes in the Far East, is in June. Chinese catch the elks by trapping them in pit-traps and when any are found with the young horns still green they are reared in a pen until such time as the horns harden sufficiently to be ready for medicinal use then the elk is killed. Sawn off antlers are much cheaper than those with the skull bones attached and these latter are valued at from 500 to 800 yuan according to their weight. The antlers are boiled under some special process for preservation, the method being a carefully guarded secret, known only to a few hunters.

Antlers of the spotted stag which is still more rare found only in the Kirin forests fetch a price even double that of the elk-horns. In Chinese and Tibetan pharmacopœia the antlers from the spotted stag are one of the most important medicines and along with ginseng are used for curing very obstinate chronic ailments.

Besides the aforementioned products the elk yields horns weighing up to 18 kilograms which he sheds every March. The horns are collected by hunters in spring. Groups of such collectors go across the steppes burning the grass to facilitate their search for the discarded horns. The horns have considerable commercial value, as many useful articles are made from them.

During the month of September, which is the mating season, the Russian hunter goes out after the stags with a horn decoy by means of which he imitates the call of a bull-elk. This trumpet is made from wood. The game which has been so attracted is shot when it comes within rifle range. The mating season is of about a fortnight's duration and in this period it is not a rare sight to see a bull-stag leading a string of 10 to 15 does.

From February to April the female is specially hunted, especially those whose time of delivery is fast approaching. The animal is killed and the unborn elk is removed, dried and pounded into powder, which is extensively used in Chinese and Tibetan medicine. Slaughter of female elk, especially under such inhumane methods and circumstances as practiced by the Chinese, will, if uncontrolled, soon see the total extinction of this valuable specimen of wild life of Manchuria.



Summit of the Hsingan Range which forms the boundary between Jehol and Chahar Provinces. The picture shows a pass from Tunghaochite to the top of the range

The tail of a female elk is highly priced by the Chinese who consider it great delicacy.

Raising of elk and spotted stag on farms, unfortunately, had never been practiced in the past due to the rampancy of bandits and because of other factors of instability, but since the advent of Manchoukuo a small beginning has been made near the city of Kirin, a two hour train ride from Hsinking. Elk and spotted stag farming will eventually bring good profits for the important reason that the demand for young horns for medicinal purposes is annually increasing throughout the whole of the Far East.

After the elk and the spotted stag, the wild goat, bear and boar follow in importance as suppliers of succulent and nourishing meat. The largest size attained by the boar is some 300 kilograms. Habitually found only in the very depths of the forests where there are abundant nut-bearing trees such as cedars, oaks, etc., when the year for nuts has been very poor and food is insufficient the boar ventures into the fields and causes immense damage to crops. Besides its meat the wild boar supplies bristles which are exported or made into brushes and rugs.

Wild goat is the principle source of subsistence for some of the nomadic hunting peoples such as the Orochons, Solons, Golds and Tungus. It gives meat for food, fur for clothing and skin for making tents. Some of the male species attain a weight as much as 50 kilograms.

The Russian hunter seeks the wild goat with a rifle and the wild boar with rifle and dogs. Dogs are used in tracking and cornering and keeping the animal at bay until the hunter arrives for the kill.

Moose is found only in the main range of the Great Hsingans and it is hunted principally for its meat and fur, which latter is used in the manufacture of imitation chamois leather. The moose attains the huge weight of 500 kilograms.

The musk is found in large numbers, principally in the forests of Kirin Province. It is hunted for the musk-gland which is only available in the male species.

Mountain goat is found only in the precipitous rocky tops of the mountains far above the timber line in Kirin Province. Hunting for it is most laborious and difficult as well as dangerous. The goat gives about 32 kilograms of succulent meat and the skin makes a valuable rug.

Mongolian antelope is only found in the Barga steppes. It may be taken most of the year but in February and March the animals herd together and migrate to other places for these two months. The Mongols hunt the antelope on horse-back. They chase it until it is utterly exhausted, when it is a simple matter to capture it, while the Russian hunts it with military type rifle or other large calibre gun.

The most valuable and most interesting as well as the most dangerous sporting prize in Manchuria is the tiger. This animal plays no small and mean rôle in native superstition in the Far East. It is valued because of the excessive demand for, and the very limited supply in respect to the Chinese and Tibetan pharmacopœia.

Chinese hunt the tiger with guns loaded and so placed against some tree in the path of the animal that it will automatically discharge the gun against itself, while the Russians boldly match their skill in winter with the aid of dogs used for tracking the king of the wilds. Tiger hunting is extremely difficult and dangerous, and demands the maximum in experience, mental and physical alertness, and knowledge of the character and habits of the tiger. A wounded tiger rarely attacks the hunter directly but goes away so as to ambush him a little later and for that one reason it is vital for the hunter to be extremely careful and ever watchful, for a wrong step may be fatal.

Even a well trained hunting dog fears to track a wounded tiger and for such purposes only especially trained native or Korean dogs are employed. The attack of a tiger is so sudden, noiseless and expert that sometimes the hunter is not even given a chance to use his gun. The force of the tiger always knocks the man to the ground and in some cases he is killed outright. There is no hope if taken unawares. The strength, agility and speed of the tiger, notwithstanding its bulk, are amazing.

The Manchurian tiger has little difficulty in carrying off the fight with a Himalayan bear of its own weight and it easily dispatches the bear with a fatal bite at the nape of the neck. So when a bear meets a tiger and is not caught unawares it usually saves itself by clamboring up the nearest tree and fearfully awaits the withdrawal of its only deadly enemy.

The tiger's principal source of food is the wild boar and it always herds them. It turns man-eater only, when it is old and has lost its native agility and cunning in getting its food by preying on fleeter-footed animals than man.

The Manchurian tiger is not closely related to the Indian or Bengal tiger as is most erroneously supposed but is sprung from the animal aborigines of Manchuria of the tertiary period. It is one and one-half times larger than its Indian cousin and it sometimes attains 360 centimetres in length, 115 centimetres in height at the shoulders and weighs as much as 400 kilograms.

Because of the great interest evinced in the Manchuria tiger by the scientific world and because of the great demand in recent years from Europe and America for live specimens of the Manchurian tiger, Russian hunters both in the Ussuri district of Soviet Siberia and in Manchuria have commenced the dangerous practice of capturing these animals by bringing them to bay and then entangling them in nets and finally binding them with stout ropes. However by such crude and dangerous methods it is only possible to catch live tigers weighing up to 160 kilograms, for it is impossible to bag a full grown animal whose agility and speed do not permit the successful manipulation of the heavy, clumsy nets.

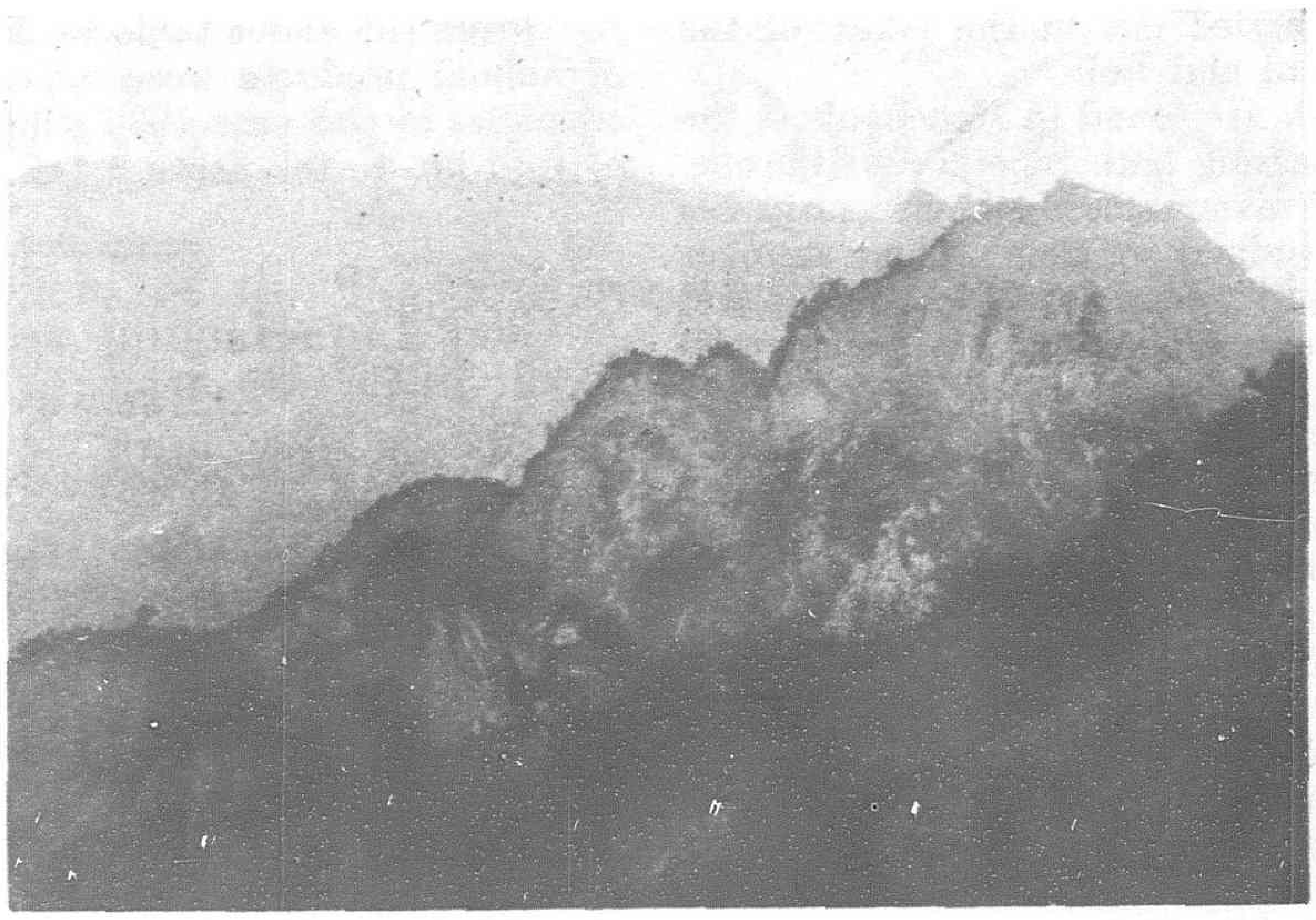
At present the world's fur market offers for the skin of a full-grown Manchurian tiger as much as U.S.$5,000, whereas the skin of a full grown tigress or the pelt of a young tiger fetches only U.S.$3,000 and that of a baby tiger up to three years old is worth only U.S.$1,500.

Throughout Manchuria some 50 tigers are killed yearly. The carcasses are frozen and sold in the market, being generally bought by the Chinese for medicinal purposes. Part of these frozen carcasses are shipped to China through Shanghai and Tientsin.

The tiger is not only found in the forests of the Little Hsingan mountains and in the great forests of Kirin Province but is also native to the Ussuri and Amur districts of Siberia and northern Korea.

In the great forests of Manchuria, especially in the eastern part of Kirin Province there are to be found three types of bear, namely the brown Siberian bear, the grey Kamchatka and the black Himalayan. All of them live where they find most nourishment, where cedar, oak, walnut and other nut bearing trees are plentiful

From November to March they hibernate; for this purpose the Himalayan bear chooses the hollows of trees whereas its two cousins select caves and other such secluded refuges in the forests. The bear is hunted for meat, skin and gall, this last article being valued for medicine. Chinese, Manchu and Koreans hunt the bear either with dynamited bait or with guns fixed against a tree or onto some other support which the unsuspective animal discharges against itself, whilst the Russian goes after bear with a gun and a pack of dogs.



Here are pictured highland views from Mount Kaoli toward Fenghuang. The Kaoli ridge forms the most southerly of six mountain passes in the region

Hunting Dogs

In Manchuria as in every backward country the breed of the native dog is somewhat primitive and in outward appearance it strikingly resembles its wild brother inhabiting the wilderness of the country.

All hunting dogs at present found in this country may be divided into two categories, locally bred and imported.

Of local bred dogs there are five distinct types according to breed, locality and training. The better known variety of native domesticated dogs in Manchuria are; (1) Mongolian greyhound or as it is sometimes called, Mongolian hare hound; (2) Orochons' wild game dog; (3) Golds' wild game dog, this animal is used as a sledge dog in the long winter season; (4) Manchurian wild game dog and (5) Korean wild game dog. The wild game dog has been especially bred to attack animals such as bears, boars, tigers and the like.

The Mongolian greyhound is high in build, short haired and greyish in color. In appearance it strongly resembles the Russian greyhound but is more massive and rougher in its habits, its strength and endurance is astounding, much greater than that of its Russian cousin. It fearlessly attacks antelope, wolves, elks and the like. Thoroughbreds are valued at as much as 20 to 30 horses or ten camels. Inner Mongolian princes are the only ones who attempt to rear these dogs and very seldom are any seen either at Barga or Cherimski Seim, and it is only in extreme cases that any are offered for sale.

The Orochons' dog is the native of Barga and the Great Hsingan district where the Orochons, Solons and Daurs domicile. It is of medium stature, of various colors, stubby, powerful and of great endurance. In packs they follow their game with fair success.

The Golds' dog is raised by the Golds and Tungus along the lower reaches of the Sungari. It is medium stature. Lean and tall, with big and erect ears, short, white hair its distinctive feature is its curled tail. It is energetic, powerful and very malicious. It never falters in attack, even singly, on boar, bear or tiger. The thoroughbred female dog is very highly prized and it is only when an owner faces an emergency that he will part with one.

The Manchurian dog is found chiefly in the Little Hsingan range and in the primordial forests of Kirin. They belong to the hunters and wild game trappers of these localities. With these dogs the hunter is frequently aided in catching sable, squirrel and Siberian weasel. In appearance this dog strikingly resembles the fox but is much longer of leg and broader of chest. Its coat is thick and soft, reddish-grey in color. The mouth, tips of its pointed ears and paws are black. It seldom barks and is as sly as its cousin, the fox, and equally malicious.

The Korean dog as its name implies is the native of northern Korea mostly owned by hunters operating there and also in the upper reaches of the Sungari, Mutankiang and Yalu rivers in Manchoukuo. It is of large build, stubby and solid. Its ears are small and flat. Its coat is short and thick and of different colors, mostly black-brown, grey like the wolf's and dun. It is very malicious towards all animals and goes singly against a tiger, leopard, bear or boar.

Along the Hsi River on the Mukden-Antung Railway. From Kaolimen to Fenghuangcheng the river skirts the mountain range full of rugged rocks and overhanging cliffs

Fishing in Manchuria

The Far East appears to be exceptionally blessed with fish, where river and sea fish form one of the principal items of food for the inhabitants. Besides, a large quantity is exported. Fishing in Manchoukuo is carried out in divers methods, viz., nets, rods and spears. Fishing is commercially pursued along the Sungari, Nonni, Mutankiang, Laioho, Ussuri and

Amur. In addition fishing is carried out in the lakes of the Mongolian steppe, principally Dalai and Buir.

More than 100 varieties of fish are found in Manchoukuo, the variety and abundance even surpassing both Siberia and Europe.

In the number and variety of mammalia Manchuria surpasses all other countries of the same latitudinal position. There are over 100 kinds of animals and the majority of them are rapacious and carnivorous. The number of animals having any real commercial value is about 35.

There are more than 300 different kinds of birds in this country of which only about 40 are commercially valuable. In quantity, Manchoukuo possesses one and one-half times as many birds as the whole of Europe and two and one-half times as many as Siberia.

Through its great wealth in variety of flora and fauna and the extensiveness of its wooded territory Manchoukuo is exceptionally well blessed, with extraordinary possibilities for expanding its attractiveness for sporting, commercial hunting and fishing as well as commercial farming of fish, fowl and game.

The steady advance of civilization and the opening up of new settlements encroaching on the forests and mountain ranges certainly calls for careful regulation and attention to game resources but by adopting a rational conservation policy it is possible to bring hunting to the same profitable level as all other commercial trades and industries.

One of the most profitable pursuits in this field is the raising of certain animals, such as fox, for its fur, and elk for its young horns.

For the preservation of valuable fur-bearing animals, such species as tiger, sable, elk, ermine, spotted stag, and musk deer must be protected from extinction. For that purpose it is imperative for the Government to establish several national parks and preserves as was the government's announced intention as early as 1936 when it decided to define the Great Hsingan range as a national park. By this means all this wealth of Manchurian flora and fauna might, under the protective care of the Government, increase abundantly.

Manchurian fur supplying and exporting centres are divided into the following four districts and the figures are for the 1931-1932 hunting season.

District	*Pieces (1,000 unit)*	*Value Million (Yen unit)*
Barga	929	1.9
Great Hsingans	382	0.7
Little Hsingans	253	0.6
Kirin Forests	1,009	2.6

TRADE IN WILD ANIMAL FURS, MEAT AND OTHER BY-PRODUCTS OF NORTH MANCHOUKUO FOR THE 1931-1932 HUNTING SEASON

Animal	*Pieces*	*Local Markets Yen*	*Pieces*	*Export Markets Yen*	*Total Yen (1,000)*
(1) Tiger	—	—	55	33,000	33.0
(2) Spotted Stag	10	2,200	190	41,900	54.0
(3) Leopard	—	—	32	6,500	6.5
(4) Sable	1,000	110,000	5.900	590,000	700.0
(5) Elk	1,000	92,800	4,000	371,200	464.0
(6) Bear	400	20,000	600	30,000	50.0
(7) Moose	1,400	49,000	—	—	49.0
(8) Lynx	75	4,375	325	8,125	12.5
(9) Otter	750	15,000	1,750	35,000	50.0
(10) Fox	750	13,000	14,250	267,000	280.0
(11) Glutton (Wolverene)	75	1,125	25	357	1.5
(12) Wild Boar	4,900	73,500	1,100	16,500	40.0
(13) Wolf	1,000	10,000	3,000	30,000	40.0
(14) Musk Deer	4,500	5,000	10,500	40,000	45.0
(15) Raccon	5,000	25,000	14,000	70,000	95.0
(16) Polecat	1,000	5,000	7,000	35,000	40.0
(17) Corsac Fox	—	—	4,000	20,000	20.0
(18) Mountain Goat	1,500	7,500	—	—	7.0
(19) Marten	6,000	30,000	6,000	30,000	60.0
(20) Siberian Weasel	15,000	56,250	60,000	168,750	225.0
(21) Ermine	—	—	3,500	10,500	10.5
(22) Wild Goat	9,000	27,000	6,000	18,000	45.0
(23) Mongolian Antelope	2,000	6,000	—	—	6.0
(24) Marmot (Prairie-dog)	—	—	800,000	1,600,000	1,600.0
(25) Squirrel	100,000	100,000	1,200,000	2,400,000	2,500.0
(26) Badger	9,500	19,000	2,000	4,000	23.0
(27) Cat	5,000	5,000	10,000	10,000	15.0
(28) Dog	100,000	100,000	80,000	80,000	180.0
(29) Mole	1,000	500	7,000	3,500	4.0
(30) Hare	10,000	2,300	190,000	43,000	46.0
Grand Total	281,060	779,550	2,431,227	5,962,950	6,742.5

From the above table we see that some six million yen worth of animal products were exported from Manchoukuo to foreign countries in the year 1932 which shows the economic importance of wild life to the State.

Coal Liquefaction and the South Manchuria Railway Company

(Continued from page 250)

liquefaction plant sent Dr. Abe and two employees to Germany in 1935 to study the enterprise in that country.

With the approval of President Yosuke Matsuoka on August 4, 1936, the S.M.R. established an office at Fushun to supervise the construction of a Y14,000,000 plant and appointed Mr. Sengoku chief of the construction office.

At a conference held at the Tokuyama Naval Fuel Station on June 7 and 8, 1937, attended by Station Commander Yoshinari and Research Bureau Chief Nomura representing the Navy, Director Kubo and Advisor Maruzawa representing the S.M.R., it was decided that the experiments conducted by the Central Research Laboratory be put into practice at Fushun. Mr. Tatsuzo Fukayama, Chief Technician of the Manchuria Chemical Industry Company, succeeded Mr. Sengoku as head of the construction office and Dr. Abe of the Central Research Laboratory became vice-chief.

During a period of ten years, the Central Research Laboratory repeated the same experiments over 300 times and long-period industrialization experiments about 100 times and finally succeeded in completing a 400 hour experiment using an S.M.R. model machine in April, 1938. In step with this great experimental success, construction work on the plant progressed favorably in spite of the various obstacles faced during the present emergency situation, and on February 21 of this year, the first test operation was conducted upon completion of the greater part of the plant.

On April 1, 1939, the plant was officially named the Coal Liquefaction Plant and numerous experiments were conducted since then to correct any shortcomings that might be found.

At the time when the S.M.R. first started work on experiments of coal liquefaction, there were only two assistants under Mr. Watanabe and Dr. Abe, but, at the present time, the staff at the Central Research Laboratory under Dr. Abe consists of over a hundred experts. No less than 1,200 experiments were conducted during the eleven years since the work was started. The tiny equipment that was used at the Central Research Laboratory has been set up at the Fushun Plant obviously for further experimentation, but the coal liquefaction enterprise which might hold the key to the solution of Japan's fuel problem has now entered into the second stage.

Information Sought

The Chinese Society of Hydraulic Engineers desires to collect the following information regarding the flood of 1939 in North China.

(1) Causes of the flood.
(2) Districts and areas inundated at the highest stage of flood.
(3) Information regarding breach of dykes, such as date of the rupture, location and dimensions of crevasse and percentage of total discharge passing through it, etc.
(4) Damage to dykes.
(5) Descriptions of drainage of flood water, such as course taken by the flood flow, date of which the inundated land was dried out, etc.
(6) Details of any change in river channels, lakes, etc.
(7) Estimate of losses.
(8) Suggestions for remedial measures, etc.

Any such information either in the form of public report or personal records will be gratefully received and paid for, if so requested. Please address.

"The Chinese Society of Hydraulic Engineers,
c/o The Chinese Institute of Engineers,
P.O. Box No. 184, Hongkong."

Continuity of Power Supply

The System of the Perak River Hydro-Electric Power Co., Ltd.

By M. J. DOWTY, B.SC., A.M.I.E.E.

(Journal of The Engineering Association of Malaya)

The use of Electrical Power has become of such prime importance to civilized communities that only an extremely high grade service is tolerated by consumers. With increased demands, existing power systems are expanding to cater for loads far in excess of those anticipated when the schemes were originally formulated, and interconnections between companies are frequently made. A power supply system may, in the first instance, have been laid out with the utmost skill, equipped with the best apparatus available at the time, well operated, and yet finds itself through expansion involved in difficulties which are inherent to the expansion. For some such difficulties a complete or partial solution may immediately be available, in the case of others the problems may be little understood at the outset and may require patient investigation and development work before the trouble is overcome. It is essential that engineers responsible for system extensions take a very broad view. The addition, for example, of a new generating set in one station of an interconnected system may appear entirely desirable to a man whose outlook is limited to generation, and yet, the result of such an addition might be to turn what was originally a stable system into one quite unstable under fault conditions. Further investigation might show that the addition of the same amount of generating capacity could be made elsewhere without being attended by such catastrophic results. The growth of a power system therefore brings with it problems to the continuity of supply which must be carefully watched. It is not too much to say that every major addition to a network must be assessed carefully from this point of view quite apart from other aspects. From the Power Company Engineers' point of view, supply continuity is an economic problem, and money can be spent on improvements only to the point where the law of diminishing returns calls a halt to further expenditure. Thus it must be understood that since the consumers ultimately pay the cost of improvements, it possibly may not, and probably in the case of the Kinta load is not desirable in their interests to spend large sums and complicate protective systems to achieve 100 per cent continuity, if this is really possible. The object of this paper is :—

(1) to survey in a brief manner the general trend in modern practice towards improvement of continuity of systems with overhead lines.

(2) to give an explanation of troubles which may arise in systems with interconnected Power Stations, and

(3) to give an account of the measures which the Perak River Hydro-Electric Power Co. has already taken or has under consideration for maintaining and improving supply continuity in view of the extensions which have taken place within the last year or two.

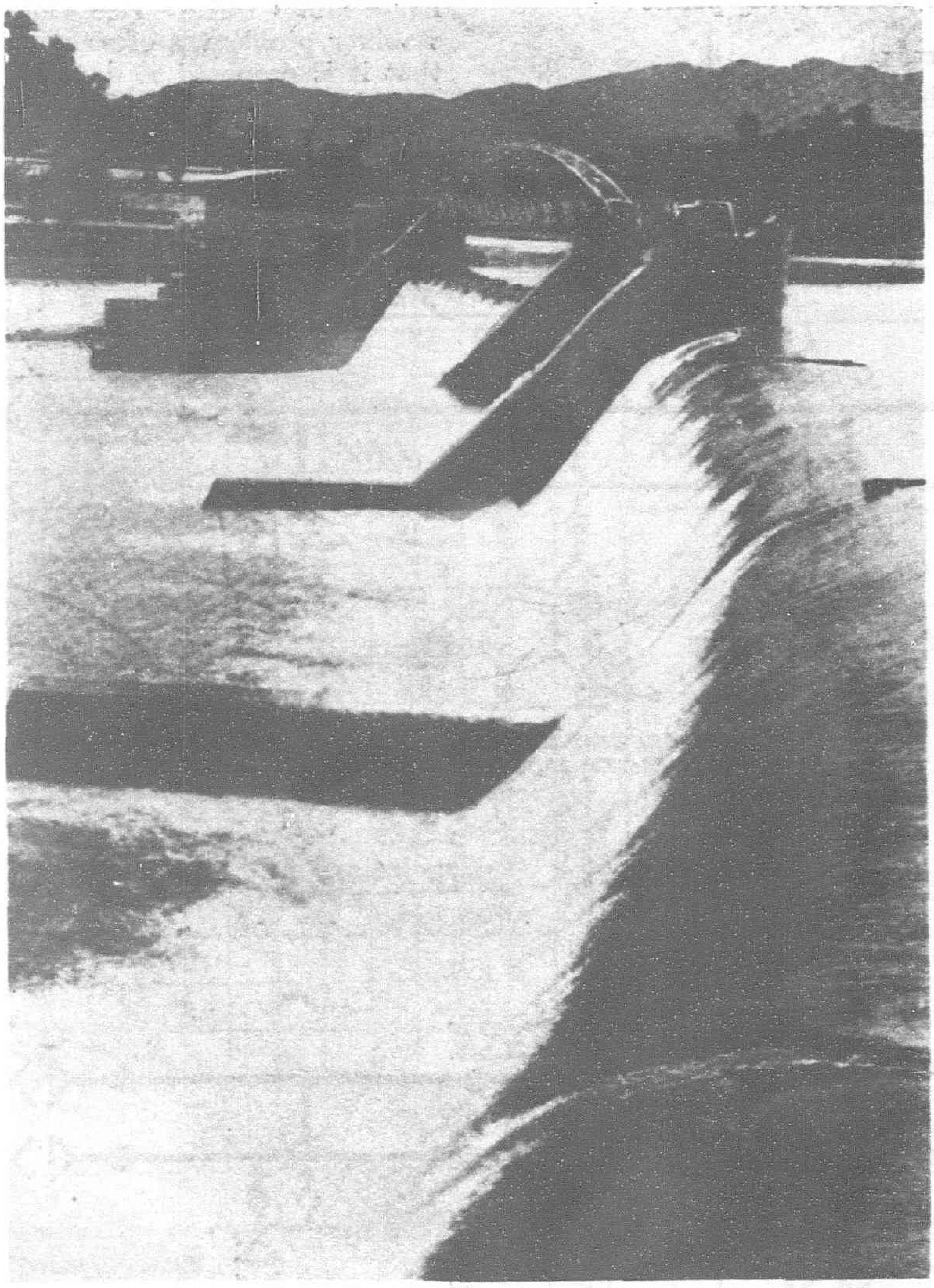
A high standard of continuity requires :—

(*a*) First class design and construction coupled with high grade maintenance to minimize breakdowns.

(*b*) Duplication of lines and apparatus where economically justified and avoidance of what may be termed "bottle necks."

(*c*) Adequate means to disconnect faulty apparatus with the least possible disturbance to the rest of the system and minimum damage to the faulty plant.

(*d*) Resumption of supply to affected areas with the least possible delay.



The Perak River hydro electric dam at Chenderoh, Perak, Federated Malay States

SECTION I.—Modern Trend Towards Improvement of Continuity

OVERHEAD LINES

Research carried out during the last ten years on the effects of lightning has resulted in the development of a design technique which makes it possible to construct a line operating at 66 kv and above to attain a specified degree of immunity against direct strokes. Multiple — usually two — overhead earth wires prevent direct strokes from terminating on the conductors, and tower footing resistances are brought to a low level so that negative reflections from the foundations of the stricken tower and from the tops of neighboring towers chop the fronts of the incoming waves and minimize the chances of flashover from the tower to conductors (*see* Appendix A).

A second method of attack which is applicable to existing lines above about 11 kv and is said to be very effective, consists of shunting all insulator strings with expulsion tubes which extinguish the power follow through arc in one half cycle. It is claimed that in some respects a single circuit line equipped in this manner has a reliability equal to that of a well designed double circuit line, but the life of the discharge tubes and consequent replacement cost has not yet been determined.

Yet a third method is based on the fact that roughly 90 per cent of faults on transmission lines are of a transient nature. Once the arc has been interrupted and the ionized air dissipated, supply may be resumed in these cases. Auto reclosing breakers and reclosing fuses have been developed for this class of service. Auto reclosing breakers have been constructed with a break and close cycle of as low as ½ second, and reclosing fuses with roughly the same minimum reclosing time are available for duty on circuits of secondary importance, where the short circuit kva is low enough to come within their rating.

An interruption of less than one second will cause no inconvenience to some classes to load, but will cause tripping of motor load where the conventional instantaneous under voltage trip is fitted. This difficulty can be overcome if the under voltage trip is equipped with a device giving a short time-lag. Equipment of this kind is also effective in preventing loss of load due to momentary voltage dips consequent upon faults elsewhere on the power supply system.

It must be realized that a high proportion of flashovers on transmission lines involve, at any rate initially, only one phase. A fault of this kind, if of a transient type, may be satisfactorily dismissed without interruption of any kind, by a tuned neutral earthing reactor known as the Petersen coil. The theory of this apparatus is touched upon in Section 3 of this paper.

SECTION II.—System Troubles

Increases in generating capacity and major substation capacity require that investigations be made into the effects of the increase in short circuit kva with reference to the following points :—

GENERAL

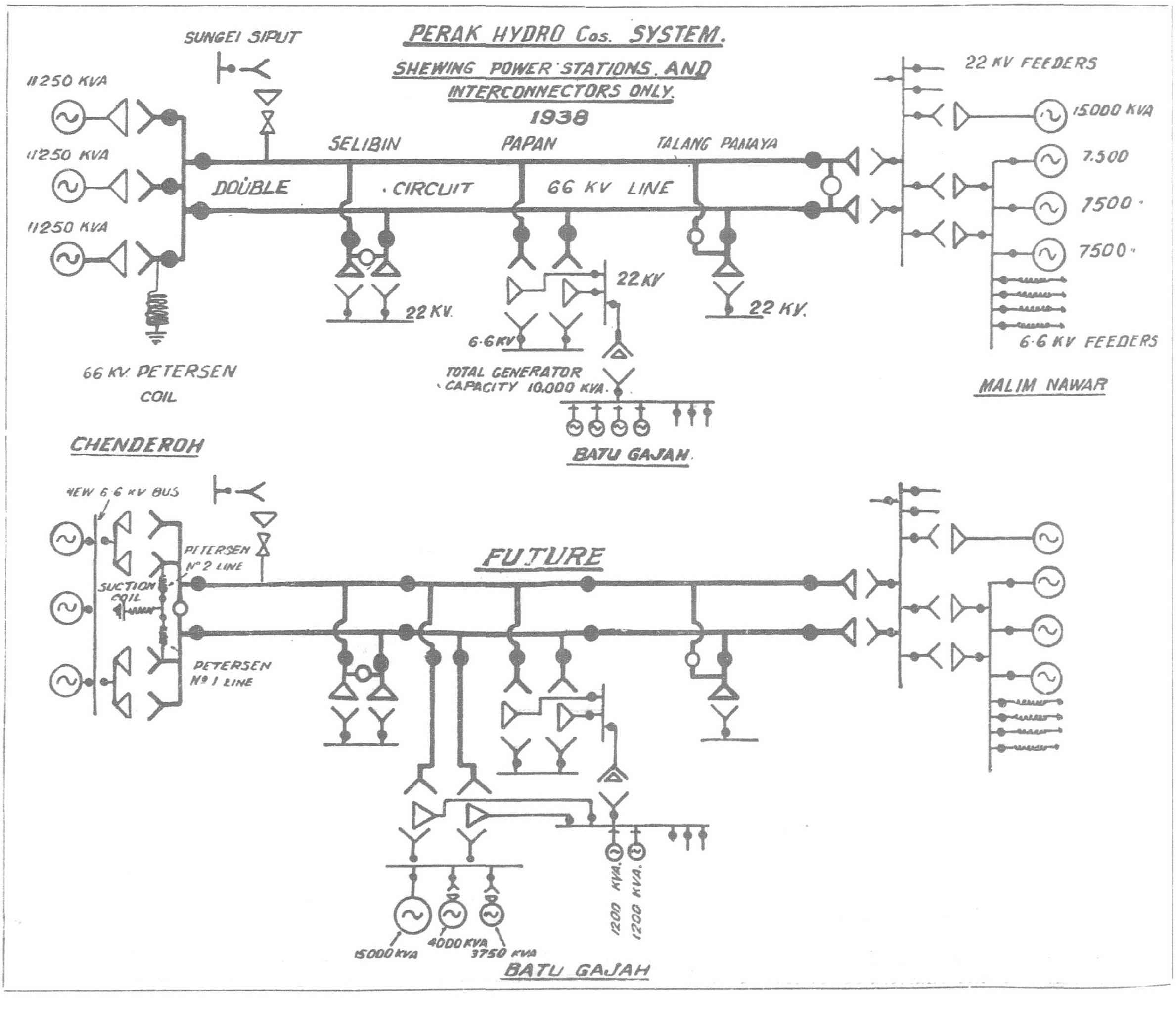
(*a*) The short circuit kva to be interrupted by circuit breakers. In many cases it is found that an increase in generating capacity renders existing switchgear obsolete, and reconstruction or replacement of the breakers is required. Circuit breakers may in some cases be reconstructed for higher duty and so saved from obsolescence by fitting one or other of the arc control devices which have been developed during the last few years. Sometimes the installation of limiting reactors may be a better solution than the replacement of switchgear.

(*b*) Increased short circuit kva produces an increase in the forces between bus-bars, and bus-bars and their supports require investigation to ensure that the free period of vibration is not such as to resonate with these periodic forces.

(*c*) Conductor sizes must be checked to ensure that heating due to a short circuit will not be so great as to cause conductor annealing or damage to the insulation of underground cables (*see* curve 2 for a particular case).

Stability

The interconnection of Power Stations may give rise to stability troubles which cause widespread interruption of supply. The stability problem is of so much importance and little understood that it is proposed to devote some space to the elements of the underlying theory.



It can be shown that the Power P delivered through a reactance X is

$$P = \frac{E_1 E_2}{X} \sin \propto$$

where E_1 and E_2 are the sending and receiving voltages and $\propto$ the electrical angle between the two voltages. This expression has a maximum value when sin $\propto$ unity, and it is obvious that since E_1 and E_2 are prescribed by operating conditions and X is a circuit constant, any increase in the load though this reactance will result in an increase in electrical angle up to a point where $\propto$ is 90°. Beyond this no increase in P can result but the circuit becomes unstable.

Consider a Hydro power station A (Diagram 3) feeding through step up transformers and a long double circuit transmission line to a load center B where a thermal station is situated. E_A and E_B will be fixed by supply requirements and X by circuit conditions, hence we may solve for $\propto$. If we now switch out one of the parallel lines or transformer banks the value of X and therefore the value of $\propto$ increases correspondingly. The generators at A will swing further ahead of B and after damped oscillations will settle down at the new value of $\propto$. The same will occur when there is an increased demand for load from station A. If, however, the change in X or the increase in load is too great, station A will fall out of synchronism with B. This unpleasant phenomenon is known as instability.

The type of instability arising from overloading is known as "static instability," while that arising from sudden changes in system setup, or most potent cause of all, from faults, is known as "transient instability."

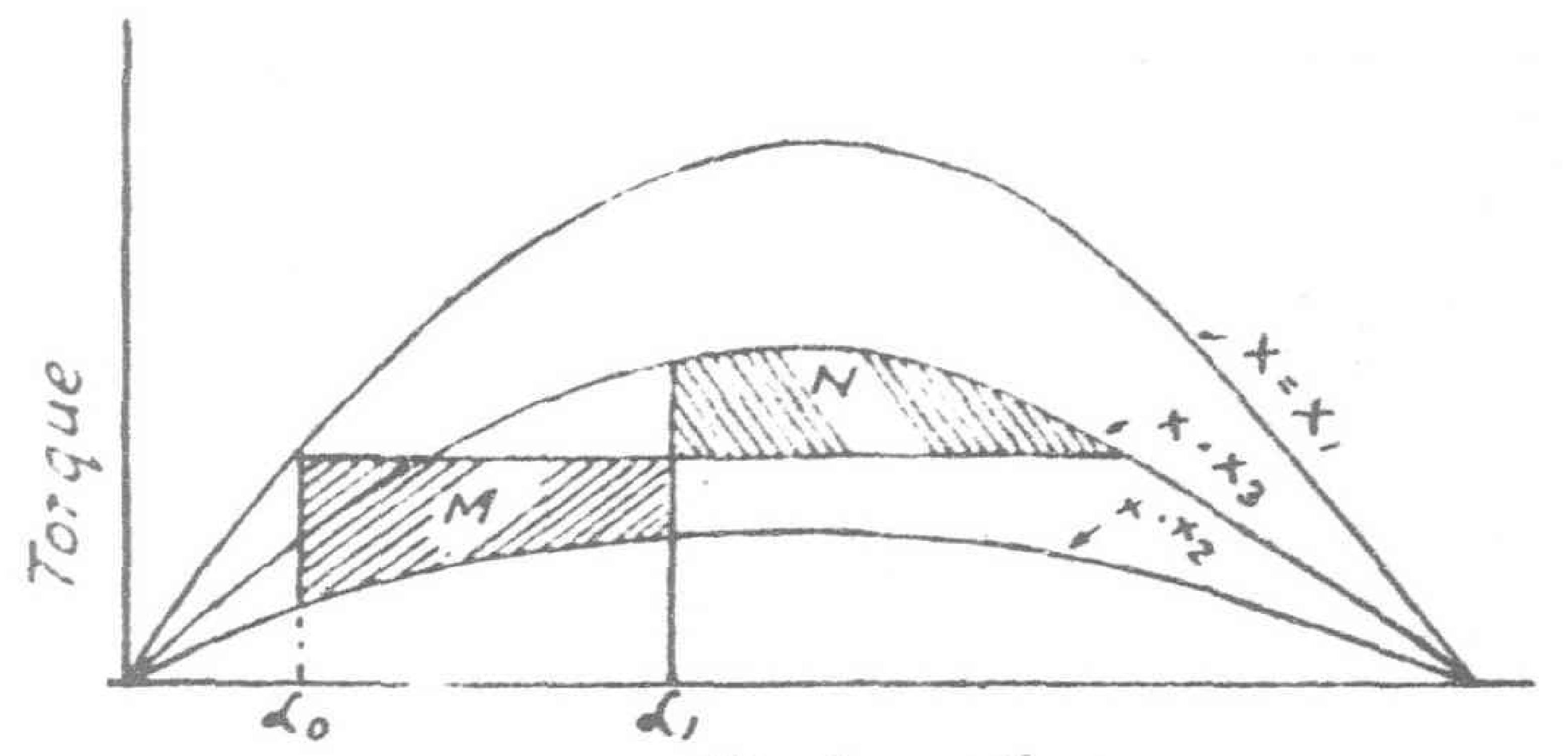


DIAGRAM 2

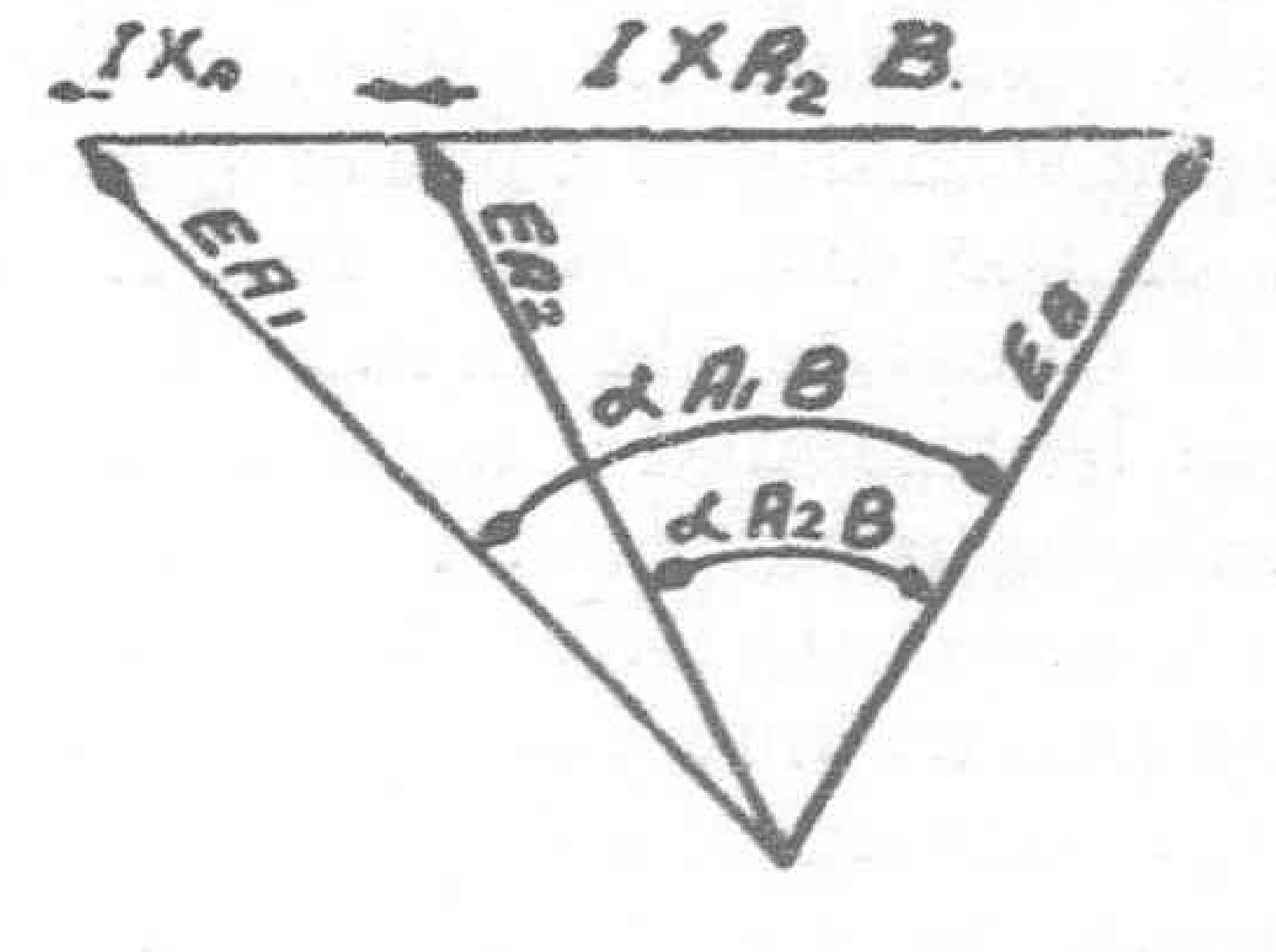


DIAGRAM 1.

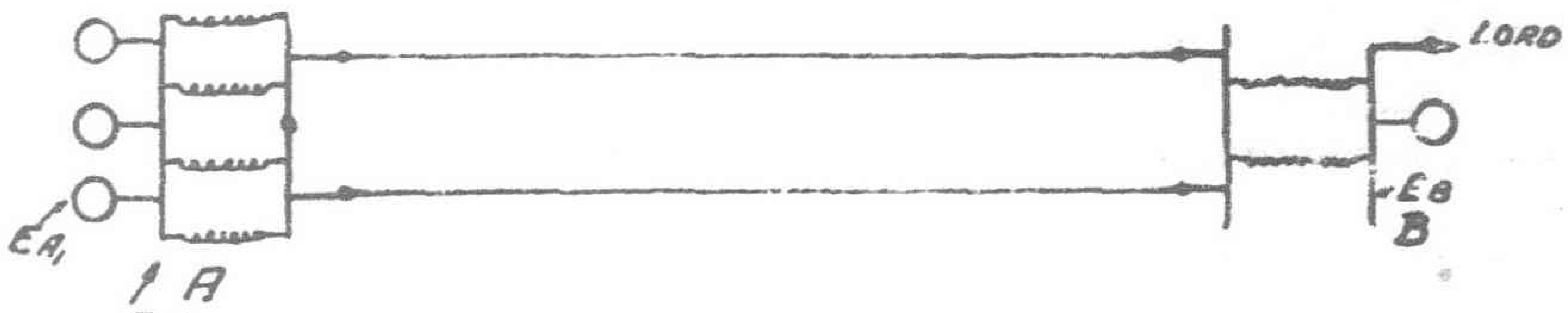
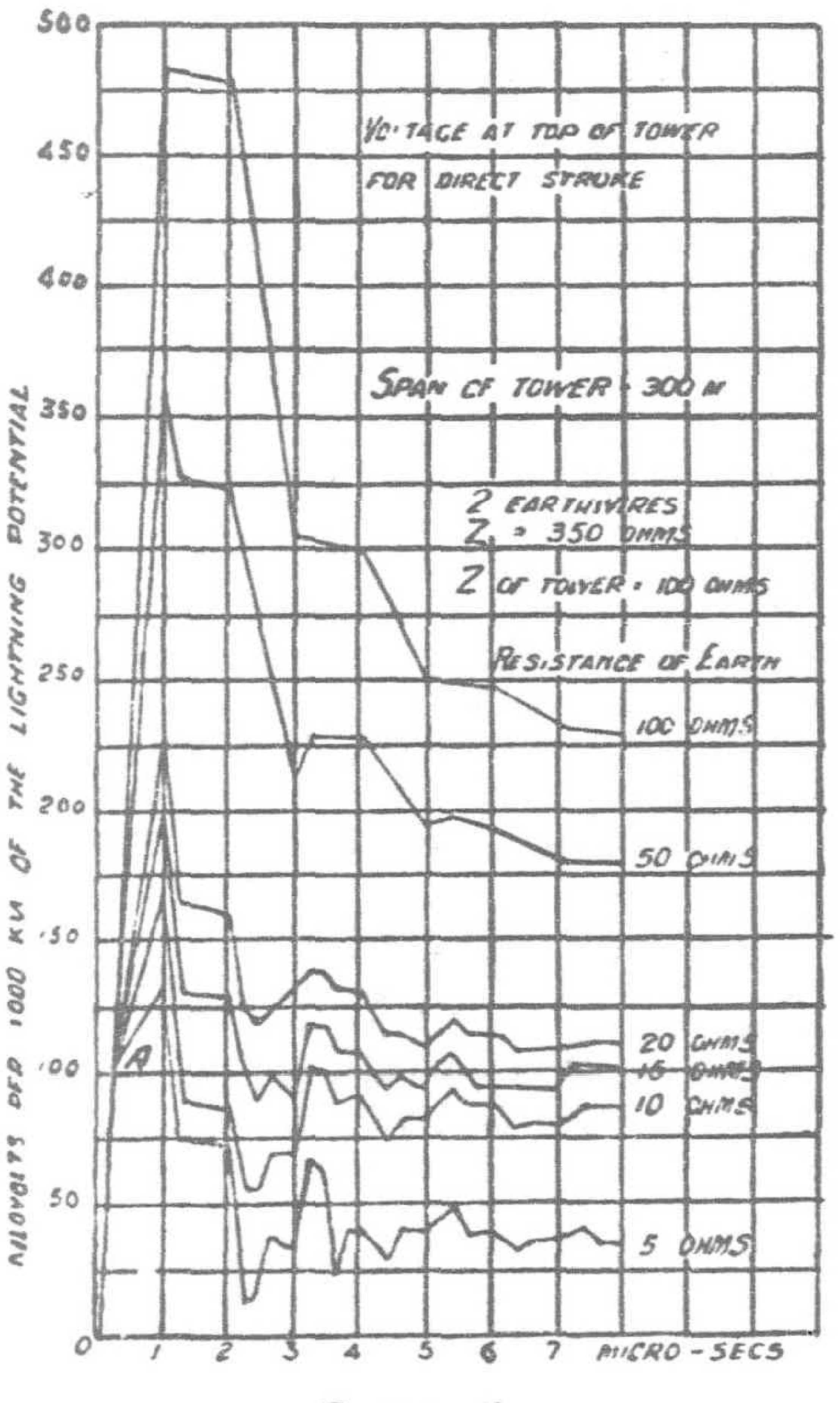
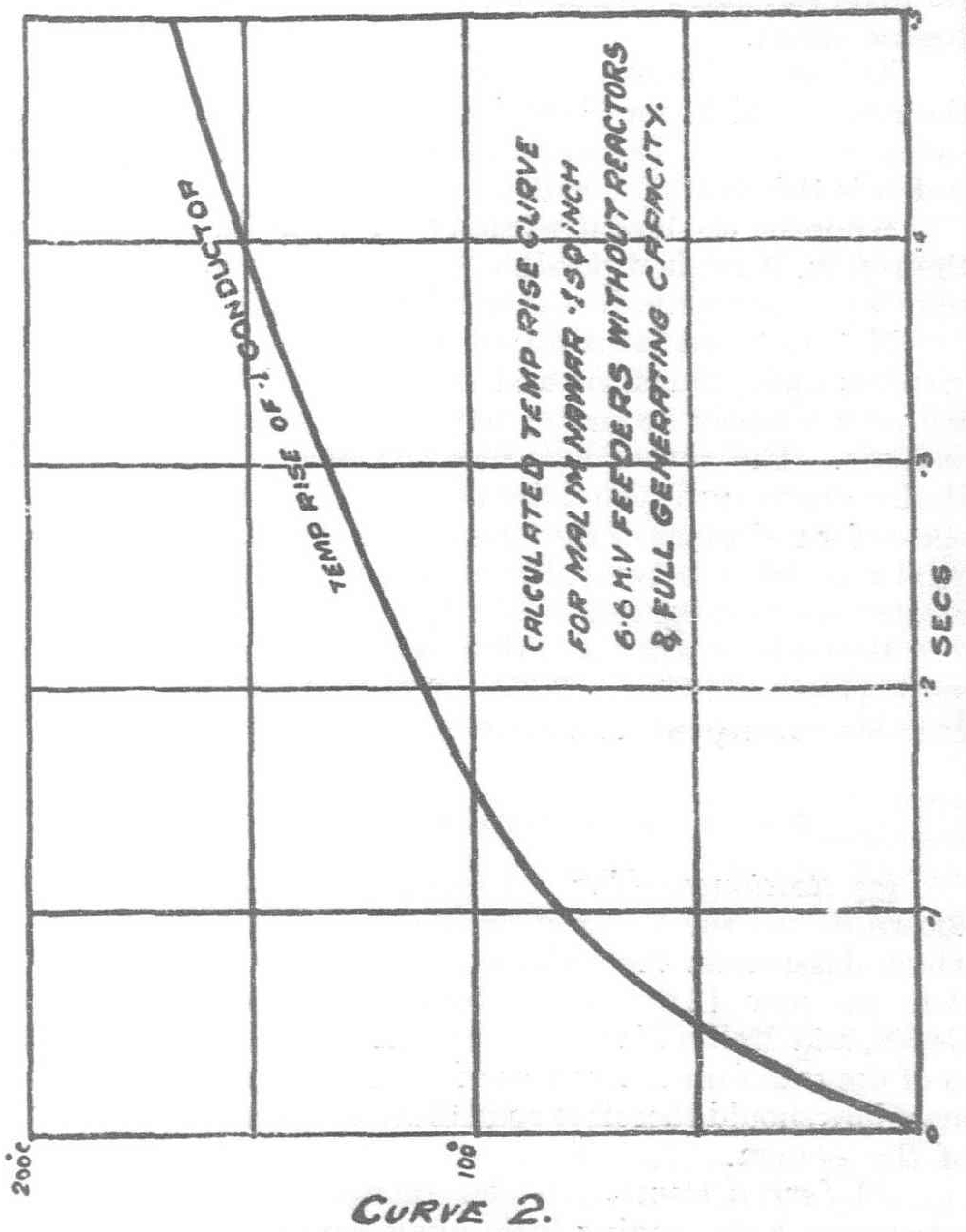


DIAGRAM 3



CURVE 1



CURVE 2.

Static Stability and the Influence of Voltage Regulators

If we assume that the bus voltage at Eb (Diagram 1) is maintained constant and consider at first that the machines at A are on hand control, then in our equation :—

$$P = \frac{E_1 E_2}{X} \sin \propto, \text{ we may write}$$

$$P = \frac{Ea_1\ Eb}{Xa + Xa_2b} \sin \propto A_1B \ldots\ldots(1)$$

where Ea_1 is the voltage behind the synchronous reactance of machines at A, Xa is the machine synchronous reactance and Xa_2b the reactance between the bus-bars at A and B.

This value of P will have its maximum when $\propto A_1B$ is 90°. At this point it is obvious that $\propto A_2B$ will be considerably less than 90°. If we now set a high speed voltage regulator to work so that under all conditions the bus voltage at A—Ea_2 can be maintained constant, the power transfer is now determined by

$$P = \frac{Ea_2 \times Eb}{Xa_2b} \sin \propto A_2B \ldots\ldots\ldots(2)$$

It is therefore obvious by inspection of (1) and (2) that the introduction of the high speed voltage regulator will have increased the stability limit, since when $\propto A_1B$ is 90°, $\propto A_2B$ is much less. In actual practice no machine excitation response is so fast that equation (2) can be regarded as giving the stability limit.

Transient Stability

In transient stability calculations it is customary to assume by the constant linkage theorem that the voltage corresponding to flux linkages remains unchanged. This voltage is often referred to as "the voltage behind the machine transient reactance," and while our Ea in the equation is the machine transient voltage, the X in the denominator includes the machine transient reactance.

A little consideration will show that the influence of a fault on the transient stability of a power system is a function of the time of duration of the disturbance and it is therefore of considerable interest to calculate the maximum relaying and switching time which may be tolerated if a given fault is not to cause instability. The underlying principles on which this analysis is carried out are briefly as follows ; (1) Before the fault, from known load conditions, the transient machine voltage Ea may be calculated and Eb is known, X_1 is known, and the electrical angle α_0 may be determined corresponding to the steady load P (*See* Diagram 2). The electrical output torque is for equilibrium balanced by the mechanical input torque to the generators. (2) When a fault occurs on one of the duplicate outgoing lines connecting A—B, the value of X *increases to* X_2, *the magnitude of which may* be calculated for any type of fault from a knowledge of symmetrical components and network theorems. The electrical output torque immediately falls to a point on the X_2 curve but the mechanical input torque owing to the nature of governor action remains substantially unchanged.

The torque differential results in an acceleration of the rotors of the A machines until at a point α 1, the faulty line section is switched out. Consequent upon the dismissal of the fault the value of X then changes to X_3 and if the conditions are as shown in the diagram, the electrical torque output now exceeds the mechanical torque input.

The area M represents the energy available for acceleration of the rotors and N for their deceleration. When N exceeds M the swing is stable. The solution is obtained for α_1, when M=N which is the limiting condition for stability.

Knowing the limiting value of α_1, and the inertia constants of the rotors, it is then possible to solve for T the critical switching time which must not be exceeded to preserve stability.

Naturally solutions obtained by a method of this kind which involves approximations and assumptions will yield figures which are only roughly accurate, but are extremely valuable as a first analysis. The author who has carried out analyses of the Perak Hydro Company's system by both this and a similar method which allows for resistance of the circuits has been frankly surprised by the good agreement between theoretical figures and practical operating results (*see* Bibliography Ref: 1, 2 and 3).

Methods of analysis are available for systems with three or more power stations. These involve point to point solution of generator swing curves and are somewhat trying to the patience.

Effect of Generator Design on Stability

(*a*) *Reactance.*—The transient reactances of the generators constitute usually a considerable proportion of the tie reactance X which determines the stability. It is interesting to note therefore that the new 12,000 kw. alternators recently installed at Batu Gajah, and Malim Nawar have transient reactances which are only .6 of the transient reactances of the older turbo alternators. These machines should therefore contribute to an improvement in stability of the system.

(*b*) *Inertia Constant.*—The inertia constants of the system generators while having little influence on the amplitude of swing produced by a given disturbance directly influence the critical switching times. A waterwheel alternator with a high inertia constant will cost more, but savings may be made in the cost of high speed switching and relaying equipment since with higher inertia longer switching times are permissible.

The inertia constant of the Chenderoh waterwheel alternators is 2.31 kw. seconds per kva at rated speed, while those of the turbo alternators are about 6.0—6.5, which are very average figures. These constants immediately point to one reason why systems with hydro stations are so much more prone to stability troubles than those supplied exclusively by turbo alternators. Other reasons for this are that the transient reactance of waterwheel sets is usually two to three times that of turbo sets, and that hydro stations commonly feed to load centers, through long high reactance transmission lines, whereas thermal stations are in general centrally situated.

(*c*) *Exciter Response.*—A high rate of exciter response coupled with high speed voltage regulators is also helpful in maintaining stability. The new 12,000 kw. alternators and the Chenderoh sets have been equipped with high response excitation and all voltage regulators have been equipped with positive phase sequence voltage control.

Effect of Synchronous Condensers

Synchronous condensers should theoretically have a beneficial effect on stability since they tend to maintain the voltage during faults. It has been the Perak Company's unfortunate experience that the condenser is usually the first machine to fall out of step during a disturbance and is consequently regarded from this aspect as a liability rather than as an asset.

An economic balance between the various factors touched upon above will be seen to constitute a very pretty problem for a consultant in the case of an entirely new scheme.

In the case of an old and growing system the solution to this problem is limited practically to the provision of high speed fault clearance.

Stability of the Perak Hydro Co.'s System

Approximate critical switching times for the Perak Company's system are given below :—

Three phase fault on one 66 kv line	.18 secs.
Phase to phase do.	.7 ,,
Three phase fault on M. Nawar 22 kv bus	.4 ,,
Three phase fault on 6.6 kv bus	.4 ,,

No other faults cause instability unless of extremely long duration.

When a fault occurs of insufficient severity to cause instability it frequently happens that much of the system load is lost through action of the instantaneous type under-voltage trips on the motor control gear consequent upon the momentary dip in voltage. Under these conditions the slower action of a waterwheel governor will tend to cause an appreciable rise in speed of other plant which remains connected, particularly if more of the load is being carried on waterwheels than on steam turbines with governors having a quicker action. Since the overspeed which can be tolerated in the case of turbo alternators is also much lower than in the case of Hydro sets, overfrequency relays have been fitted to protect the steam sets from mechanical tripping on overspeed, thereby splitting the system to ensure continued operation of the steam plants. The remedy lies in the fitting of time lag devices to under-voltage trips, a course of action which would well repay consumers from the point of view of running time since the tripping of motors due to a momentary voltage dip means lost operating time.

SECTION III.—Development Program of the Perak River Hydro-Electric Power Co., Ltd.

Tower Lines which have recently been constructed to Messrs. Balfour Beatty's designs are arranged for two overhead earth wires. Recent research on the effects of lightning strokes on tower lines shows that this type of construction together with low tower footing resistance offers improved protection to direct strokes which alone are of consequence at voltages of 66 kv and above.

On all 66 and 22 kv lines single phase flashovers to ground are dealt with by Petersen coils which have proved most successful.

In an unearthed neutral system the power arc following the lightning flashover is the capacity charging current to the lines and connected apparatus. When such a flashover occurs in the case of system earthed through a Petersen coil the phase to neutral voltage impressed on the coil causes a current to flow through the fault which is the vector sum of the lagging current to the coil, and the leading charging current to the lines. By proper tuning when the Petersen coil is installed this resultant current can be made of so small a value that the arc cannot maintain itself for more than a few cycles, and in this manner a potential fault is dismissed from the system without disturbance.

It should be remarked that double circuit lines do not constitute complete duplication. Mechanical damage to a tower would probably involve both circuits, and this is also true of a lightning stroke. This latter factor complicates relaying, and in the case of the 66 kv double circuit lines, the present construction program to Messrs. Balfour Beatty's designs calls for a Petersen coil for each line, with a "Suction coil" to take care of mutual capacitance between circuits. Simultaneous single phase to earth faults which have not been uncommon in the past will thus be entirely eliminated. In this way electrical duplication of these lines will be nearly approached and no more would appear to be justifiable from the economic stand-point since with three power stations, and adequate generating capacity this line is not so vital as it would be if Chenderoh were the only source of supply.

In the case of 6.6 kv distribution networks the capacity charging currents are so small that compensation is not necessary. It is therefore becoming standard practice to earth 6.6 kv transformer neutrals through potential transformers. No power arc can therefore follow a single phase to neutral fault, and no interruption occurs if the fault is of a temporary nature. Should the fault persist for more than a few seconds however, relay in the potential transformer secondary closes the earthing resistance switch and permits sufficient fault current to flow for the defective circuit to be relayed and switched out.

Insulators have been given much thought. Disc insulators have always been found more reliable in service than pin insulators since it is most unusual for more than a proportion of the units to suffer damage and a damaged string will usually carry line voltage until replacement is convenient. This is not, unfortunately, so often true of pin insulators. The present trend is therefore to the use of insulator strings, on 22 kv lines instead of pin insulators. For 66 kv lines pin insulators have of course never been used.

Insulator ageing troubles were discussed by the author in a paper presented to the Association some time ago and the method of live line testing described therein is in constant use to ensure that the insulation of the 66 kv lines is maintained at a high level.

Nearly all disc insulator strings are fitted with arcing horns or grading rings which prevent flashover arcs from impingeing on the porcelains and so causing damage. This principle has been extended to pin insulators on some of the 6.6 kv lines. In the case of 6.6 kv lines the gaps employed are small (2½—3″) and it is possible that their presence while reducing serious damage may result in an increased number of momentary interruptions. Their value is therefore controversial, and can be settled only by reference to operating records after several years service. Interruption records for the period July-December 1938, Appendix B, are markedly in favor of the gaps.

Auto Reclosing Breakers and Fuses

For some time a number of automatic reclosing breakers have been in service on the 6.6 kv distribution networks, but the break-reclose cycle is too slow to enable motor load to continue in service even with the assistance of time lag devices on the undervoltage trips. Recently a number of three shot auto reclosing fuses were ordered from America for 22 kv distribution line sectionalizing service. Short circuit tests gave good results and if operating experience is satisfactory their use will be much extended. The time of reclosure is approximately one half second or longer if desired, and if motors are fitted with time lagged undervoltage trips it is expected that 90 per cent of faults on line sections protected by these fuses will in consequence be of no moment to the consumers.

Time Lag Devices for Undervoltage Trips

It is known that certain lines of motor control gear obtainable in the U.S.A. have for some years had a time delay undervolt mechanism available as a standard fitting, but the author is not aware of manufacturers of control gear in the United Kingdom who have made the same advance. For the conversion of existing control gear an inductor (electrical) type of time delay available from the U.S.A. appears desirable since its installation requires only that electrical connections be made. The cost is fairly high.

It would appear desirable that home manufacturers should equip their control gear in this manner as a standard extra, and engineers ordering new equipment are recommended to call for control gear so provided.

The state of local industry consequent upon tin restriction has made it advisable to shelve the question for the time being owing to the large costs which would be involved except in so far as enquiries and development work are concerned.

Stability

Mention was made under section 2 of the improved stability characteristics of the new 12,000 kw. turbo alternators which have low transient reactances and good excitation response under the control of improved automatic voltage regulators.

Instability due to faults on feeders fed from Malim Nawar 6.6 kv bus has been entirely eliminated by the installation of cast in concrete reactors which were designed and made by the Company's staff to achieve this end, as well as to reduce the duty on old switchgear, and overheating in the outgoing cables during short-circuits with the new generating plant in service (*See* curve 2).

The present program of reconstruction provides for the replacement of existing 66 kv line relays by high speed distance relays and the lines will be sectionalized at Papan. One of the 22 kv lines from Malim Nawar has already been equipped with high speed relaying and in time something may be done to the other double circuit line. The 22 kv oil circuit breakers at Malim Nawar are being replaced as opportunity offers by a newer and faster type embodying crossjet explosion pots and faster mechanisms.

While it is hoped that the new equipment will deal satisfactorily with 66 kv phase to phase faults the short critical time for 66 kv three phase faults makes it unlikely that any attempt will be made to meet this condition which fortunately is extremely rare. The provision of high speed relays and switches to clear a fault inside nine cycles would be too expensive to be warranted at the present time.

Fault Recorders

High chart speed recording instruments whose operation is initiated by undervoltage relays have been installed at important centers and records obtained during disturbances have been of the greatest value in investigating the behavior of the system during faults.

Conclusion

In the introduction to this paper the statement is made that it may be undesirable to aim at 100 per cent continuity. To reassure members of the Association prone to think the worst of those who refuse to hitch their waggon to a star of the first magnitude, reference is now made to an extract from the report of the Control Engineer of the Perak Hydro Company (*see* Appendix B).

It will be noticed that lost time has fallen steadily from .109 per cent for the period January-June 1936 to .017 per cent for July-December 1938. These figures speak for themselves.

The author is well aware that from an electrical engineer's point of view this paper is a painfully inadequate attempt to survey some of the factors involved in maintaining good service. He hopes, however, that the subject matter may be of value to those whose interest in electricity lies in its ability to make the wheels of industry revolve ninety-nine point nine and then something per cent of the time.

No original matter is embodied in this paper and indebtedness must be acknowledged to the authors of many articles published during the pastt en years in the *G.E. Review* and *The Electric Journal*. Thanks are also due to the Management of the Perak Hydro Company for permission to read this paper.

APPENDIX A.—LIGHTNING CALCULATIONS ON TOWER LINES

Surge Impedance

In an electrical circuit when an oscillation occurs, an interchange of energy takes place between the electrostatic and electromagnetic fields. Neglecting losses it can be seen that the energy $\frac{1}{2}$ C.E.^{2} corresponding to the maximum voltage must be equivalent to $\frac{1}{2}$ L.I.^{2} when I is the current maximum.

Hence $\frac{E}{I} = \sqrt{\frac{L}{C}} = Z$ — Z is known as the surge impedance.

Reflections of Travelling Waves

When a voltage wave travelling along a path of surge impedance Z_1 reaches a point where the impedance changes to Z_2, reflection and refraction take place.

The reflected wave.

$$E_1^1 = E_1 \frac{Z_2 - Z_1}{Z_1 + Z_2}$$

E_1^1 is negative when Z_2 is less than Z_1, and the wave is reflected negatively in its entirety when Z_2 is 0.

The refracted wave.

$$E_2 = E_1 \frac{2Z_2}{Z_1 + Z_2}$$

In investigating the effects of a direct stroke on a tower top the first step is to calculate the reflection and refraction co-efficients at the top and bottom of the stricken tower, and at the neighboring tower tops if the line is equipped with earth wires.

The surge impedance of a lightning path is 300-400 ohms, that of a tower 100 ohms and the footing resistances range usually from 5-100 ohms, while the surge impedance of twin earth wires is about 350 ohms.

Having assumed the shape of the incoming wave it is then possible to calculate the resultant voltage curve at the stricken tower top which is the resultant of the incoming waves and the reflected waves from tower foundations and neighboring tower tops.

A series of calculated curves (Curve 1) reproduced from C. L. Fortescue's paper " La Foudre et ses effets sur les lignes aériennes " shows very clearly the beneficial effect of low footing resistance.

At point A the reflections from the tower base arrive back at the summit and subsequent to this the wave shape is very strongly influenced by the reflected waves, both from the tower base and from the neighboring towers.

EXTRACT FROM CONTROL ENGINEER'S REPORT

APPENDIX B.

The interruptions are allocated below, to the various parts of the system responsible for them and the corresponding figures for previous periods are given for comparison.

	1938 July to Dec.	*1938 Jan. to June*	*1937 July to Dec.*	*1937 Jan. to June*	*1936 July to Dec.*	*1936 Jan. to June*	*1935 July to Dec.*
Transmission Lines							
66 kv	—	6	2	2	4	6	1
22 kv	13	8	6	7	7	13	8
11 kv	4	1	8	2	—	—	2
6.6 kv	59	92	57	83	54	92	44
Total	76	107	73	94	65	111	55
Substations							
66 kv Switchgear	—	1	—	—	—	—	—
22 kv ,, ...	2	3	1	3	—	3	—
6.6 kv ,, ...	8	3	6	6	10	15	4
3.3 kv ,, ...	—	—	—	—	—	—	—
Transformers	0	1	1	—	1	1	3
Cables	0	1					
Earth Resistances.. ..	1 (Fire)						
	11	9	8	9	11	19	7
Generating Stations ..	4	1	—	2	1	—	1
Relays	1	1	5	11	12	11	3
Operation	4	5	4	6	7	5	3
Consumers Gear	6	22	18	21	30	19	7
Total Number of Interruptions	102	144	108	143	126	146	65
Interruptions of more than ten minutes	16	32	34	42	55	67	29
Per cent kva hours lost ..	.017	.041	.037	.060	.088	.109	.066

COMPARISON OF FEEDERS. WITH AND WITHOUT ARCING HORNS

6.6 kv Line faults	*Feeders with Arcing Horns on every 5th pole*		*Feeder without Arcing Horns*	
Interruptions of more than two minutes	Total	1	Total	6
	Per feeder ..	.04	Per feeder ..	.19
	% of Total .. kva hours lost..	4.1%	% of Total kva hours lost	31.2%
Momentary interruptions of two minutes or less	Total	30	Total	28
	Per feeder ..	1.25	Per feeder ..	.90
	% of total kva hours lost ..	1.3%	% of total kva hours lost..	1.0%

REFERENCES

The author has the following papers available for reference in Ipoh.

Stability.

Power System Stability—Booth and Dahl (Non-Mathematical Review) G.E. Review 30, 31.
Solution of two machine stability problem—Byrd and Pritchard, G. E. Review 33.
Calculation of two machine stability problem with Resistance—Pritchard and Clarke—G. E. Review 34.
Graphical Solutions for Multimachine Stability Problems—Barry—Elect. Journal 36—2 articles. G. E. Review 38.
High Speed Protection and System Short Circuits—Ross and Ryder, I.E.E.J.—38.

Petersen Coil.

Application of the Petersen Coil—Hunter—G. E. Review 36.
Line Protection by Petersen Coils—Taylor and Stritzl, I.E.E.J.—1938.
The Petersen Coil—" Engineer," 1937.

Transmission Lines.

La foudre et ses effets sur les lignes aériennes —Fortescue.
La Foudre—Peek.
Both papers in proceedings of Congrès International d'Electricité, 1932.
Series of lightning and surge protection articles Torak and Ellis—Elect. Journal 33.
Lightning Computations for Transmission Lines—Jordan—G. E. Review 34.
Protection of transmission lines against lightning. Theory and Calculations—Bewley—G. E. Review 37.
Lightning—Goodlet—I.E.E.J. 37.

Circuit Breaker Reclosure.

Keeping the line in service by Rapid Reclosing—Griscom and Torak—Elect. Journal '33.
Immediate Reclosing of circuit breakers—Emmons—Elect. Journal '35.

Quinquina, Source of Quinine

FAMOUS men and sometimes relatively obscure people have given their names to countries, towns and objects that we use without giving a single thought to the man or woman who originally bore these names. When we go to America, it does not occur to us to think of Amerigo Vespucci, Christopher Columbus's companion, the first to give us a description of the New World. When we mention the words watt, ampere and ohm—household words for anyone with the slightest acquaintance with our modern marvel, electricity—we do not think for a moment of James Watt, Andre-Marie Ampere and George Ohm, whose names have been perpetuated in these scientific terms. When people speak of the guillotine, their thoughts fly back to the bloody days of the French Revolution when the flower of the French aristocracy bowed their heads beneath the blade: the French Doctor, Joseph Ignatius Guillotin, who gave his name to the famous instrument of execution, is quite forgotten. When munching a sandwich, who gives a thought to Lord Sandwich, " inventor " of this delicacy? A host of similar examples might be given. In course of time, the original meaning of the word fades from the memory and becomes inseparable from the object it denotes.

How many of us realize, for instance, that quinquina, or " cinchona " as it is sometimes called, owes its name to the gratitude of a lady, the Countess de Chinchon? This lady had suffered for many a long year from malaria, contracted in the Spanish colonies. Then one day, in 1638, some-one made her drink an extract from the bark of a tree (" chinchona bark ") and she was instantly cured. Full of joy she went back to Spain and made known the remedy in Europe.

In the three centuries which have elapsed since the day when the Countess drank her first potion of chinchona bark, countless human lives have been saved, countless cases of fever assuaged by the use of quinine in the malaria-ridden tropics. The Malaria Commission of the League of Nations recommends as a preventive measure a daily dose of six grains of quinine during the malaria season. In cases of treatment a dose of 15 grains to 20 grains of quinine a day for five to seven days is sufficient. On page 124 of its report, issued in 1938, this Malaria Commission stresses the fact that the harmlessness of quinine makes it a suitable drug for administration by subordinate personnel without constant medical supervision, whereas such supervision is essential in the case of synthetic products.

Three centuries have elapsed since the Countess de Chinchon gave her name to this extract of chinchona bark and humanity is still making profitable use of the product, the name quinine being now inseparably linked with that of malaria.

Irrigation in China

By C. A. MIDDLETON SMITH, M.SC., M.I.MECH.E.

(The Engineer)

AGRICULTURE, especially irrigation farming, has been the leading industry in China, production being dependent upon the proper functioning of a great variety of water control works, invariably constructed and maintained by the State. Although China has many different geographical regions, each with its own peculiar characteristics, almost all the agricultural regions are dependent upon man-made methods of water supply. Great as is the area that has been made to produce food by thus supplementing the rainfall, there remain thousands of square miles that can be made more productive by modern irrigation schemes.

It must be emphasized that the extreme poverty of the rural population of China, and the reluctance of Government officials to finance large irrigation schemes, have often compelled modern engineers to employ primitive methods that fit into the economy of the country.

The detailed investigations of K. A. Wittfogel have convincingly established the fact that "irrigation is everywhere in China an indispensable condition for intensive agriculture, on the basis of which Chinese agrarian society has been constructed, just as the industrial society of modern capitalism has been constructed on the basis of coal and iron." That is, to a great extent, true of other parts of South Asia, such as Indo-China.

In the Yangtze and Kwangtung river valleys, in the central and southern areas, the problem is one of continuous drainage of fertile, but swamp, alluvial land and the maintenance of a complicated system of drainage and irrigation. In many parts of North China irrigation is essential for food production. In the lower Yellow and Hwai River valleys flood control is the main problem, but the important Saratsi and other irrigation schemes utilize the waters of the Yellow River.

In recent years the political and international trade problems connected with China have been brought prominently to the notice of the British public; a satisfactory solution of many of these problems must depend upon the development of modern engineering schemes. Although details of various irrigation works have been published in the Far East, very little seems to be known about them in Europe. Even the European hydraulic experts, sent out by the League of Nations to investigate water control problems, in this decade, seem to have revealed, in their official report, great ignorance concerning the economic and social conditions in China, which are of importance in planning engineering schemes.

The future of the Chinese nation is of intense interest to the British Empire; it is therefore reasonable to believe that British engineers will be interested in the technical details of works carried out mainly with the object of increasing the standard of living of the people. It has been said that there are 450 million potential customers in China, but they cannot buy unless the natural resources of the country are developed so that the total wealth of the nation is increased. Practical methods of achieving that purpose are to improve water control, to place power behind the worker, and to increase communications.

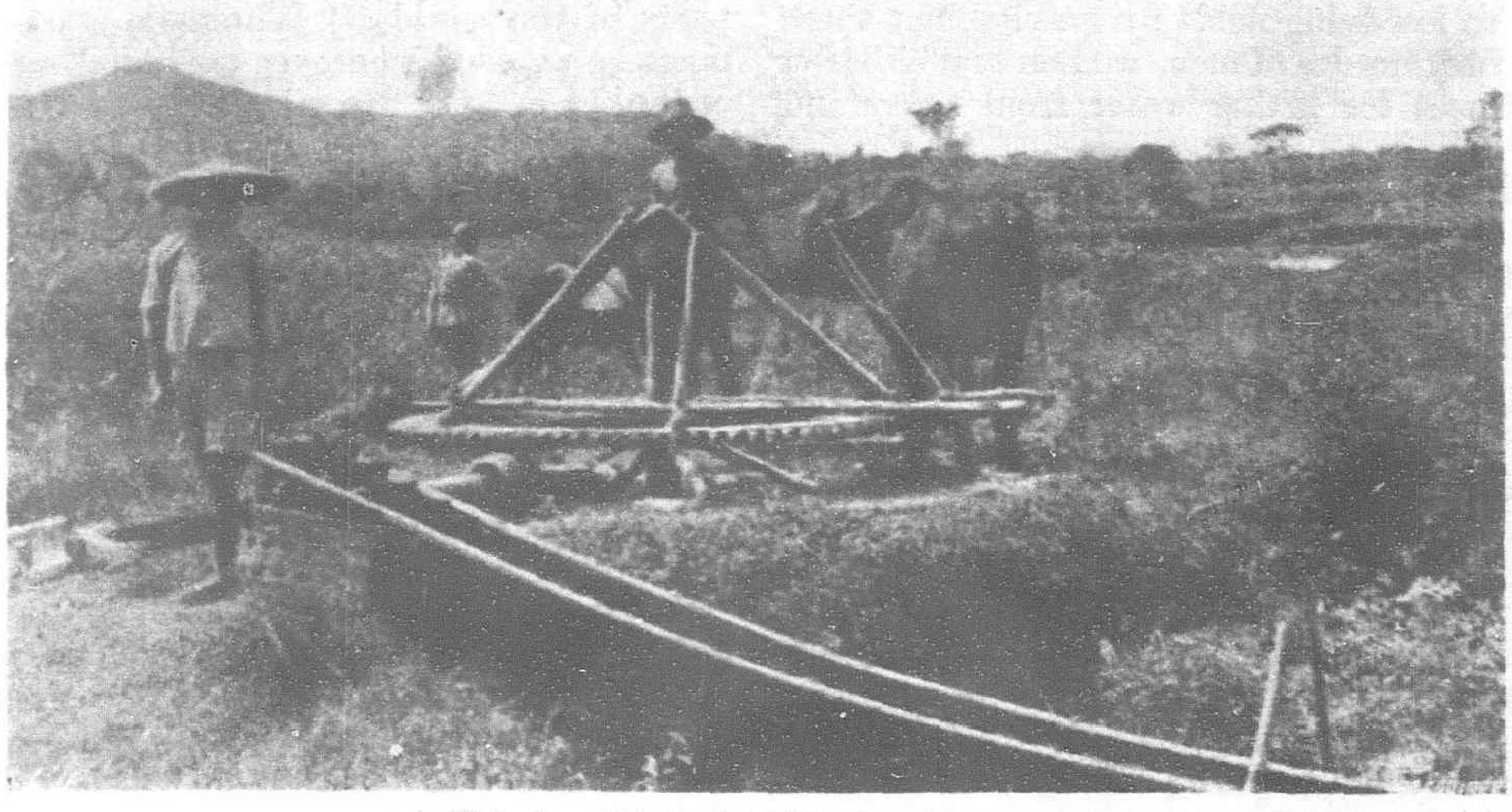


Fig. 1.—Typical "Dragon" pump

The Early Efforts

There are reliable records proving that irrigation was practised in China in the eighth and fifth centuries before Christ. The earliest of the known public works, constructed on a large scale, was for irrigation purposes; it was the Shih reservoir in Northern Anhwei province, built somewhere about 600 B.C.

Two thousand years ago, Li Ping transformed a large area in the interior province of Szechuen from a desert into productive rice fields. That remarkable scheme has been maintained efficiently throughout the centuries. In every generation since it was finished it has provided food for millions of Chinese. Szechuen had a population of 71 millions, now greatly increased by refugees from the Yangtze valley. It is now the center of Government for China. In other provinces there are irrigation works that have been in use for centuries.

In the Wei Pei region in North China, for an area comprising more than 600,000 acres of land, great efforts have been made in recent years to remedy the gradual deterioration of irrigation schemes. Yet in 246 B.C. a scheme by a remarkable Chinese engineer, Cheng Kuo, successfully irrigated that area for 150 years, at the end of which time it failed. A main canal, from the mouth of the King River valley, watered the great plain, but the swift current wore down the river bed, Cheng Kuo's dam was destroyed, and the river water fell too low to reach the canal. Many small irrigation schemes were subsequently carried out, in the numerous dynasties, and a new project to irrigate the whole plain by modern methods of investigation and design was initiated and partially completed in recent years. The full economic benefits that must follow from this scheme are now so obvious that it will some day be finished. Then it will provide China with the most ambitious undertaking of its type planned in modern times.

There has been as yet no single irrigation schemes carried out in China of the same magnitude as some of those completed by the Government of India. There the large projects completed this decade, viz., the Lloyd barrage and canals in Sind, and the Mettur dam project in the Madras Presidency, and other schemes have irrigated 29,880,000 acres, the revenue from water rates showing a good return on capital expenditure. Mention should also be made of remarkable work carried out by French engineers in Indo-China, where one completed scheme has placed 3,000,000 natives on an area previously deserted. Many thousands of square miles of land in Asia could be made much more productive by new or improved irrigation projects. The experience gained, both in India and China, shows that large irrigation schemes, properly designed and constructed, and efficiently maintained, are not only profitable, but raise the standard of living for the people in the districts affected by them.

In China's vast north-west provinces—Kansu, Ningshsia, Shansi, Shensi and Suiyan—the people had only partially utilized the waters of the Yellow and other rivers for irrigation purposes until the last two decades; only small projects had been carried out. But since about 1927 a number of plans have been prepared by foreign and Chinese engineers and four larger and very important schemes were carried well towards completion before the Japanese invasion stopped work. One of the many tragic results of the warfare in China has been the destruction of engineering works and the terrible privations of millions of farming peasants.

The Variable Rainfall

Although China, with a total area of 1,896,495 square miles (as compared with the 121,101 square miles of the British Isles), has many different geographic regions, and each has its own peculiar characteristics, yet almost everywhere the basis of food production is irrigation.

The severity, duration, and continuous recurrence of drought, and flood, throughout Chinese history, causing enormous loss of life and property, show that the natural process of water supply in China is not only unreliable, but positively disastrous. The trouble with the rainfall in China, especially in North China, is not its general abundance or deficiency, but its great variability from year to year.

The area of the North China plains is more than 125,000 square miles, each with an average population of 647 persons. The average rainfall is about 20-in., some 80 per cent of which falls during the summer months. Irrigation is needed for every square foot of crops, except where the risks of dry farming are taken.

A study of the total annual rainfall and its distribution as observed by the engineers of the China International Famine Relief Commission (C.I.F.R.C.) shows that in the Saratsi region (North China) within seven years, 1923-29, there were five years when there were less than half crops because the rainfall came too late for ordinary crops, though the annual rainfall in one of these years was 14-in. Since frost usually comes soon after the middle of September, nothing can be grown after July. Irrigation is imperative in this region if the farmers are to have security.

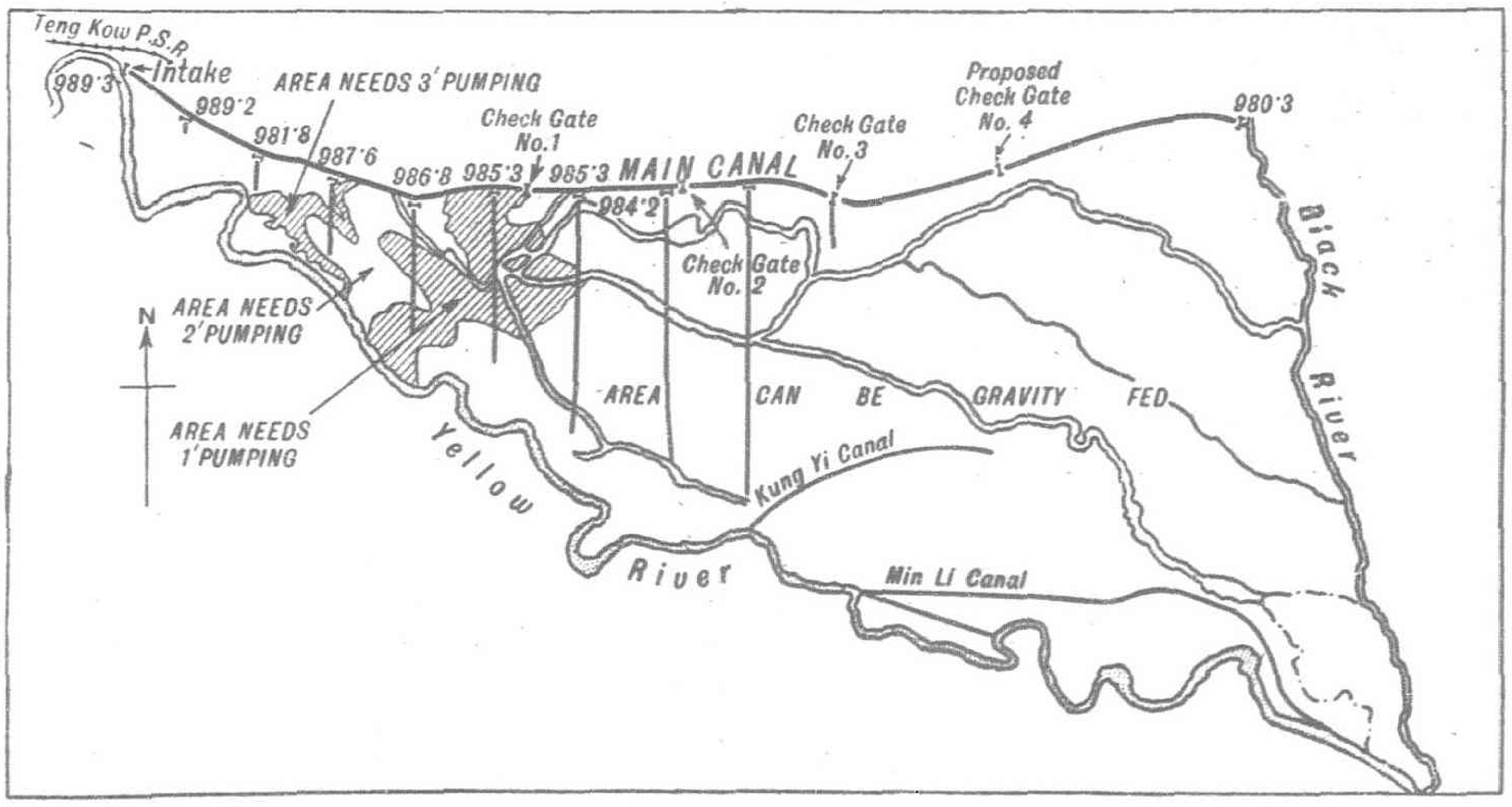


Fig. 2.—Map of the Saratsi irrigation scheme

Much of China's soil is very fertile, especially in the great delta areas of the Yangtze, the Yellow and Pearl rivers, and in many other river valleys. To-day the huge plains of China proper are invariably criss-crossed by a network of canals which enable the farmer to obtain water for his land. In spite of mechanization progress, in some parts of the country. Chinese agriculture is marked by the intensive application of human labor and the absence of power-driven machinery. Mechanism there is, but at present in nearly every case it is simple, and some of it is crude. In many places the water moves on to low-lying fields by gravity, but there are in other parts of the country hordes of men, women and children who work primitive appliances for lifting water from rivers and canals on to the fields.

The bamboo water-wheel, placed on the edge of a running stream, and from 20-ft. to 50-ft. in diameter, is often used to lift water in the buckets. At flood periods the wheel must be removed to escape destruction. It costs little to build, can be easily repaired, but as a prime mover it is very inefficient.

The dragon pump (Fig. 1) is in extensive use in Central and South China. There is a wooden rectangular trough, about 12-ft. long and 1-ft. wide, with an endless chain of wooden paddles, that just avoid the sides. They can be made for less than 15s. in South China. Power is supplied to a rotating shaft on which is fixed a sprocket wheel. Men, women and children seem to supply most of the power, but water buffaloes, donkeys, and even steam or oil, are also sources of power geared on to the pumps. In recent years small modern pumps driven by oil engines, carried in boats, have been available for hire in a very limited area. They proved to be a success, and in time should become more popular.

In many places, with lifts less than 6-ft., willow baskets, dipped in the stream and dumped on to the canal, are lifted by hand labor.

Water from Rivers and Wells

Although the bulk of the water used for irrigation work in China is supplied by the rivers, many thousands of wells are also used for the purpose in North China. A survey, made in 1930-31 in the province of Hopei, showed that in one county 40,000 wells were in use for irrigation purposes, exclusive of those used for domestic purposes in villages. Relief agencies from America supplied funds for modern well digging after the severe drought famine of 1920-21. The wells average about 30-ft. in depth and 6-ft. diameter. The cost per well was about 15 dollars (gold) for labor, and the same price for curbing bricks and board bottom. One such well can serve about three acres of land, but some, where the inflow is rapid, can serve as much as eight acres. The pumping is mostly done by hand. A good Persian wheel pumping outfit costs from 30 to 50 dollars (gold). They were formerly made of wood, but in recent years those of metal have become available, and are as cheap as wooden machines. A donkey or cow often supplies the power. If the Persian wheel is too dear for the farmer, a hand windlass is used. The new irrigation canals connected with the Yellow River demand a lift of only from 1-ft. to 3-ft., and farmers will find that supply preferable to wells with a lift of 20-ft.

It may be mentioned that in the Yangtze delta many kerosene engines and centrifugal plants were installed to replace dragon pumps and coolies; but in North China on lifts up to 8-ft., coolie labor, using old kerosene tins to bale out canals, was much cheaper than engine power. Steam-propelled pumps have been installed in some places. The use of power depends on the ability of the community to pay. With low-paid manual labor, which in 1935 was obtainable at about 4d. a day—it is probably less since the Japanese invasion—it is likely that hand labor will be used for years. Plans for the development of hydro-electric power have been prepared. It was assumed by the designers that many pumps would use electric power.

The Duty of the Engineer

This century has witnessed a considerable increase in social services and a greater interest in humanitarian enterprises in all parts of the world. "Wholesale starvation by drought in China must be avoided wherever possible," wrote an American executive of the C.I.F.R.C. He said: "It is felt that the engineer has a duty to humanity here, and not all of his plans are to be based on the immediate profit motive, though he must be economical in using funds and must be guided by due sense of proportion." Where there is a good prospect of developing large areas of food-producing lands to preserve human life, the work should be done, even if the return from taxes or profits from speculation may not be sufficient to stimulate financial aid for a well-planned scheme.

The pressure of population on land in China is probably more intense than in any part of the world. An historical study of the irrigation schemes shows that for nearly 3,000 years the people have attempted to increase the food supply in various areas of the country by engineering works. The development of irrigation in Chinese history, through the centuries, is described in detail in the enormous quantity of records preserved in the Gazetteers (local historical geographies) and special Chinese volumes concerning "water benefits," written by officials during the many dynasties that have governed the nation. This mass of literature shows that every ruler in China, since the dawn of national history, realized the intimate connection between water control, agricultural productivity, and the state of the public treasury in the country.

Politics and Water Control

The development of "water benefits" and the construction of hydraulic works for the sake of increasing food supply and facilitating its transportation, was formerly considered by the rulers to be essentially a function of the State. The fact that irrigation canals, were built mostly as public works link them closely with politics. The development of such public works were decided primarily, not by humanitarian considerations, but by the political objective of the ruling classes. This explains why, in each period of Chinese history, certain regions received more attention than others and were often developed by the authorities at the expense of other regions. Thus the evolution of the remarkable system of artificial waterways in China was almost entirely due to the desire of the rulers to facilitate the production and transportation of grain tribute to the seat of Government. The vital importance of the grain tribute is shown by the fact that for centuries taxes were largely collected in kind. Food tribute was a chief source of supply for the central bureaucracy and the army, concentrated at the seat of power. The accumulation of tribute grain was an indispensable reserve to feed a large force retained to suppress a rebellion or to repel an invader. It is no exaggeration to say that before the advance of modern warfare, grain was the basis of life for an army, and a sufficient grain reserve was its most important weapon. It is therefore small wonder that the grain tribute, its production, collection, and transportation was always the chief concern of the ruling house and its bureaucracy in China. Having increased food production by means of irrigation, it naturally followed that artificial and natural water routes, of vital importance as arteries of commerce and administration, should be kept clear for food transport.

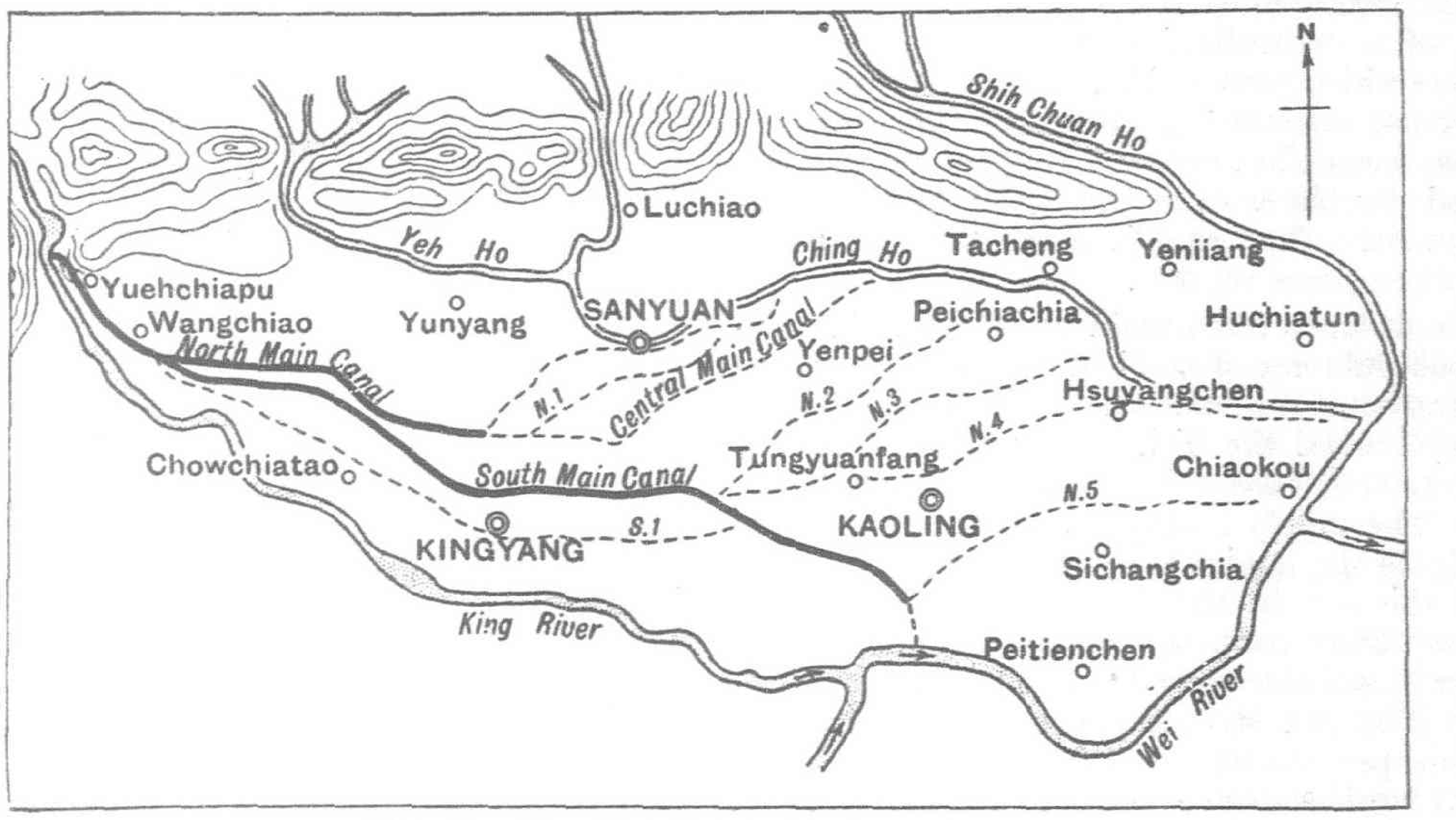


Fig. 3.—The Wei Pei irrigation scheme

Irrigation Indispensable

The cradle of early Chinese civilization was in the north, in that large area which contains a great deal of loess soil. The statement has been accepted by modern experts that "whenever moisture relations are favorable, loess is an extremely fertile soil, due to its rich stores of potash, phosphorus and lime." Loess receives water like a sponge; its high porosity and great capillary capacity enable the mineral elements, hidden in deep soil, to rise to the top, thus bringing them within reach of the roots of the crops. This mechanism can only be brought into action when there is sufficient water; hence irrigation in many parts of the loess region is imperative. Numbers of rivers in North China carry a tremendous amount of loess as silt, which silt can be diverted advantageously to the fields by a system of canalization. As far back as about 95 B.C., after the completion of the Po Canal, which conducts the silt-laden water of the Ching River to a large agricultural area in the heart of what is now the Shensi Province (72,290 square miles), the peasants sang the following lines:—

A tan of Ching water contains much silt;
It irrigates and it fertilizes;
It makes your crop grow;
It feeds millions in the country's capital!

Modern Irrigation Works

There is therefore ample evidence to prove that before the "opening of China" in the middle of the nineteenth century by Western Powers, the Chinese had with primitive tools developed a remarkable socio-economic system, dependent for its success very largely upon irrigation. It was a system which retained its fundamental features longer than any other in history; it supported a nation which to-day consists of about 450 million people, of which about 80 per cent work on the land. Chinese history is now no longer the history of just one country, for it has merged into the stream of world history. Yet the fundamental problem of food supply for the many millions in China still exists. One result of the "opening of China" has been a very great deal of humanitarian work concerned with irrigation and famine relief, and done through the agency of Anglo-Saxon engineers and Anglo-Saxon funds. The tremendous change that has taken place in recent years has been the introduction of modern engineering methods in China, so as to increase the food supply in many parts of the country.

In the north-west during the years 1930-37 four large irrigation projects were carried well along to completion. These are the Saratsi project in Suiyan Province in the far north-west, and also the Weipei, Lo Ho, and the Wei Ho schemes in the Shensi Province. The Weipei project was in full operation for more than a year before the invasion of 1937.

The Saratsi Project

The Saratsi project utilizes the upper waters of the Yellow River. This scheme (Fig. 2) was undertaken in 1929 to give at least partial relief to more than 280,000 acres of flat farm land. The main canal has a bed 60-ft. wide, which extends to the east for over 40 miles. Main laterals, leading off at three mile intervals, run to the south, nearly to the Yellow River, which flows in a southwest direction at the point. The Saratsi plain is so flat that the gradient of the main canal had to be established at 1 : 8300. The work was financed by the Suiyan (Provincial) Government and the China International Famine Relief Commission (C.I.R.F.C.). Cement, timber, and other supplies were brought along the Peiping and Suiyan Railway, a free contribution by the Government. At times bandits interfered with the work. The services of a number of foreign volunteers, both in the engineering and business sections of the work, reduced the cost of the project. The average cost of excavating canals for irrigation by hand was only two cents U.S.A. currency per cubic yard.

In June, 1931, the main canal was finished. Some 3,000 Chinese soldiers were seconded to provide labor to complete the most difficult part of the main canal, where heavy pumping was needed to keep down the water level. But in 1933 unusual rains brought down torrents from the mountains. Dykes were broken and large quantities of sand, washed in from the fields, silted up the canals.

Experiments made before the project was completed showed that in the early spring, when the ice break occurs, the fairly silt-free water will help to clear out some of the silt deposited in the canal during the autumn months.

It was impossible for private enterprise to finance the scheme, but the severe famine, caused by drought in 1928-29, caused a semi-American philanthropic group to provide the funds needed to proceed with the work. These funds were, however, not sufficient to complete the scheme, although since 1935 it has been in partial operation. The water supply from this canal system supplements the ordinary rainfall sufficiently to ensure a far greater regularity in stable crops than had been possible before. Sufficient structures, including masonry head gates, check gates, wooden bridges, have been built to effect a considerable increase in food production. In time, sub-laterals will be dug by the farmers.

Mr. C. P. Hsueh was the leader of the C.I.F.R.C. engineers who made the first surveys for the Saratsi scheme in April and May, 1929. The general policy was to produce a scheme that would not swamp the local population with an excessive dead load of cost, and one which the farmer himself could develop under expert direction. As their crops brought in more revenue and as their numbers increased, irrigation would bring water so near to all farms that the worker would no longer have to bale from a deep well or desert his home in times of drought. The plans for the scheme are sound, and when at some future date the Saratsi area is fully irrigated the economic benefits to the people will be great. The work completed has been of value to a large number of farmers.

"China's Sorrow"

In ancient times one who succeeded in improving the Yellow River so as to make the land more productive, was entitled to rule the country. Scholars agree that in the drama of war and peace, victories and defeats, brilliant eras of prosperity and large-scale public works in China, there have been two imposing backgrounds—the good earth with hordes of farming peasants tirelessly at work, and the great waterways indifferently dealing out blessings and curses. The natural outcome of these conditions was a despotic political structure. But the despots could only retain their power if they maintained public works connected with the inland waterways. Any weakening of a centralized government caused the ascendency of feudal rulers which rendered hopeless the accomplishment of large-scale national engineering projects. One result of the Japanese invasion has been the increased unity of the Chinese people, who have learned, by bitter experience, the necessity for one centralized Government. That should make possible large-scale engineering works when peace returns.

The Yellow River built up a huge plain in North China, depositing in time enormous volumes of solid matter brought down from the interior. Accurate measurements have shown that at the intake of the main Saratsi canal the Yellow River has a flow at maximum of just under 130,000 cusecs, but at extreme low water the flow is 5,000 cusecs. The supply is ample, but the problem was to raise the water to irrigate the land. Care must be taken not to over-irrigate. Much of the soil in the Saratsi region will raise good grain crops, such as millet, oats, and wheat, when there is a sufficient supply of water. Reliable records show that in the fourteen years, from 1919 to 1932 inclusive, the average rainfall in the Saratsi region was 12.5-in. per annum. In 1928 the total rainfall was about 7-in. Drought famines seem to occur in China's northern provinces in about one out of every three years.

The Saratsi irrigation scheme provides a striking example of the root cause of so much tragedy in China, viz., the lack of intelligent leadership. When the C.I.F.R.C. engineers completed their work, including not only the provision of the main canal, but several lateral canals, spaced about three miles apart, with head gates, check gates, and lateral head gates, and frequent wooden bridges across the main canal, the scheme was handed over to an organization of Chinese. The work was begun not only to improve food production, but to employ labor for famine relief. Engineers were superseded by officials with no technical knowledge or experience. There was no suitable maintenance. The C.I.F.R.C. engineers thought that the local farmers, aided by the Provincial Government, would carry forward the work and improve the project. They would not even do the light pumping needed to make the scheme efficient. Probably education and droughts will teach them to make full use of the facilities provided by engineers. Given the opportunity, engineers could utilize the Yellow River ("China's Sorrow" throughout the ages) for the benefit of millions of China's peasants. It is, however, a fact that, in spite of much neglect by officials in past years, the invasion of China has been, not only a great shock to the nation, but an education. There are many officials nowadays ruthless in their methods to ensure efficiency. They are determined to use modern engineering methods, adapting them to the inexhaustible supply of cheap labor that is available. The Saratsi irrigation scheme has not been a failure, but there is ample room for its improvement and extension.

Although this part of China has been, in theory, for some time occupied by the Japanese, yet the sturdy peasant farmers have not been conquered, but co-operate with the Chinese guerillas in every way possible, and have been so successful in harassing the invaders that it seems certain that the Japanese will never rule over that area.

Irrigation in Shansi Province

There are records which cover a period of 3,327 years, from 1390 B.C. to A.D. 1937, which show that 63 years of severe famines occurred in the province of Shansi. Of those famines, 128 were caused by drought, fifteen by floods, twelve by locusts, seven by drought and locusts, and one by flood and locusts.

The principal river in the province is the Fen Ho, a most important tributary of the Yellow River. Most of the 119,000 square miles of Shansi are bare of forest cover; much of the remaining portion is barren loess, hills cut by erosion, an area of deficient rainfall, with but little irrigation. A great deal of the land of South Shansi is above the river level, so that existing streams cannot be directly utilized. In North Shansi the river is too swift and inconstant in flow for direct purposes. More than 100 counties exist in the province, and in the past the officials in each county dealt with water control. Although always confronted with the standing danger of drought, the priority of other districts for water supply was respected The people lived in comparative harmony—a tribute to their peaceful and patient nature—until the recent invasion roused them to fight.

In thirty-nine counties there were 156 irrigation canals. Private or semi-private companies irrigated about 63,200 acres, the farmers irrigated 37,900 acres, and 3,300 wells supplied water to irrigate 1,980 acres. A total of about 98,900 acres was irrigated.

In 1929 the Shansi Government commenced work by building a permanent masonry dam, and in 1931 the first three pumping stations were finished. In 1932 a ten-year plan was proposed, which included the following:—(1) Irrigation by wells of 28,260 acres; (2) irrigation by pumping plant, 14,100 acres; (3) irrigation by diversion from rivers and springs, 1,090,000 acres; (4) construction of storage reservoirs on the upper Fen Ho; (5) bringing the Yellow River water on to Shansi lands.

There are four other rivers in the province of less importance than the Fen Ho. Although considerable survey work has been done, using funds supplied by the Shansi Government, neither funds nor time permitted such detailed investigations as was done in the case of the Fen Ho. Very large sums of money had been expended by irrigation companies in the region of these four rivers in digging canals and building rather insecure dams, weirs, and gates, but the work and plans were not in accordance with modern ideas. There is a good prospect that moderate-sized storage reservoirs will conserve waste winter flow, so that it can be used in the spring months to supplement the streams feeding the irrigation canals.

Other Schemes in Shansi

A district, known locally as the "Lower Hotung," lies south of the Fen Ho, and east of the Yellow River, parts of the plateau being more than 1,000-ft. above the Fen Ho at its mouth. The farm lands are estimated at about 400,000 acres, and to serve them a big project, involving pumps, was worked out. Hydro-electric power for pumping was assumed to be available for the scheme. The pumping plant was estimated to cost 500,000 dollars (Chinese currency), and the canal system would cost about the same. An annual income of one million dollars from some 340,000 acres of land served would result. Assuming that hydro-electric power was available at twice the theoretical cost of production, the annual operation and upkeep of the irrigation system was estimated at 350,000 dollars.

The Yumenk'ou project includes a two-stage pumping scheme, the first stage 85-ft. and the second stage 100-ft. Canals would cost 24,000 dollars, and plant, 164,000 dollars. About 800 h.p. would be needed. The total annual charges of the scheme work out at 50,000 dollars. An annual—and rather high—water tax of about 21 dollars per acre would have to be levied to warrant expenditure. It is estimated that the irrigated land would yield 140 dollars per acre annually from cotton.

Another scheme to use electric power from the falls on the Yellow River is the Humgmen Chu irrigation project. This involves lifts of water from 100-ft. to 400-ft. to supply irrigation canals for cotton crops.

There can be no doubt that the carrying out of these irrigation and necessary hydro-electric power schemes would mean an increase of many millions of dollars of revenue annually to the province of

Shansi. Land values and crop values would increase so much that the living conditions and spending power of the people would soon be greatly improved.

The Wei Pei Irrigation Project

Because of its long history and close association with the ancient center of government, this scheme (Fig. 3) is perhaps the most interesting in China, for the Wei Pei plain was the first center of Chinese civilization. This plain, in the center of Shensi Province, contains nearly 1,000,000 acres of good farmland. Much of this area was the site of an ancient lake which contained salty water. The soil, discharged from the neighboring ravines, and the loess carried by the wind, gradually changed the lake into a plain which is about 1,150 square miles in area. It is watered by six rivers, the King, Yeh, Tsing, Tsoh, Che, and Lo. The main rivers of the plain are the Wei River and the King River, which have been tapped for irrigation purposes many times during the past twenty-one centuries (the first irrigation system was built in 210 B.C.).

Observations have produced evidence that this region, and particularly Kansu and Suiyan, are becoming drier at a more rapid rate than other parts in China, chiefly owing to dry winds bringing sands from the Gobi Desert and thus burying good farm land.

The average rainfall in the Wei Pei region is about 15-in., and in dry years it is only 8-in., which is very unsatisfactory. But the soil there is generally splendid for grain crops, and with adequate watering sustains plant life until long periods of drought cause it to bake.

After the severe drought famine of 1920-21, the Shensi authorities urged that the matter of utilizing the King River waters for irrigation purposes should be considered. The necessary surveys were made, but owing to civil war the required work could not be carried out. After the drought of 1930 the matter was once more seriously taken up and necessary funds allocated. The previous field studies have been revised and work was started in December, 1930, and completed in June 20, 1932. The work included: (1) The construction of a concrete diversion dam, 215-ft. long, across the King River; (2) the construction of a canal, cut out of rock on the hillside and open, one mile long; (3) the construction of a tunnel in limestone rock, 1,300-ft. long, to carry water up to 565 cusecs; (4) the construction of eleven bridges of stone masonry. The dam, 215-ft. crest length, is 30-ft. high at maximum section, with a top width of 16-ft. Two sluices provide for flushing the mud through. Hand-operated head gates, of steel, sliding against bronze plates, installed in the concrete dam, close the openings tightly to stop flow into the canal when the silt load is big.

Unskilled labor was paid from eight cents to ten cents U.S. currency per day of ten working hours. Skilled workmen, carpenters, stonemasons, had wages twice that figure; average excavation costs, including deep cutting to a depth of 70-ft., worked out at six cents (U.S.A.) per cubic yard.

The total expenditure up to early 1938 was 500,000 dollars (U.S.A.), a very large sum in China for one irrigation project. The value of 100,000 acres of farm land was tripled by the work done. About 5,000 men were employed, and practically all the work was executed by hand. The only equipment was an air compressor with accompanying drills and a small pumping unit. In order to bring the air compressor over a distance of 180 miles from the terminus of the Sunghai railway, a special road had to be built over 30 miles of country.

The watershed above the intake from the King River has an area of about 16,000 square miles. At rain periods the flow of the river has been estimated at 550,000 cusecs, but in January and June a figure as low as 250 cusecs has been recorded for short periods. Heavy silt loads in flood time make storage impracticable on the main river and most of the branches. The new tunnels and main in the canal were designed for 565 cusecs, about ten times that possible in the old system.

Various Other Schemes

Chiang Kai-shek, the courageous President of China from 1927 onwards, tried not only to unify the government of the country, but to continue and enlarge the activities of the C.I.F.R.C. He formed the National Economic Council; after 1935 all irrigation undertakings came under its control.

A number of well-planned schemes were designed by Chinese engineers under the direction of the N.E.C. For example, Hsu Shih Ta planned to irrigate about 50,000 acres by diverting part of the water from the Hu Tuo Ho, a river rising in Shansi Province and finally joining up with the Fu Yang Ho. The whole system consists of a diversion dam with sluices on both sides, a regulator and a leading canal, an auxiliary sluice for the canal, the main canal and laterals, the pumping plants. After careful surveys and revision of plans work was started in September, 1933. The construction was done mainly by manual labor. Pumps and light tracks and cars were used, but as the transport of heavy machinery from any port was heavy, and local labor was very cheap, modern appliances were not used to any great extent. Stone blocks, as heavy as one ton or more, were moved to the dam surface by hand labor.

It is impossible to describe the details of many other irrigation schemes in China. Sufficient has been written to give a very general idea of the general problems which the engineers are called upon to solve. All the bulk of the expenditure is used on labor and materials found in China; yet considerable sums have been spent on imported equipment.

Messrs. Glenfield and Kennedy, with extensive experience all over the world (and especially in India, where practically all the large water regulators connected with reservoirs and rivers have been supplied by them) have provided a great deal of equipment for Government schemes in China.

In recent years the Japanese, even before the present invasion, had considerable political control in North China. Their engineers have made proposals to increase the productivity of the agricultural land and to utilize water power. One scheme included a dam across the Yung Ting Gorge to supply energy for a plant of 150,000 kw., but other engineers have pointed out that a more logical scheme is to use the coal in the district for generating power. If we assume that the Japanese will obtain political control in North China, they will most certainly extend irrigation works in order to increase agricultural products. But, as in Manchuria, British firms will find it difficult to compete for the supply of equipment.

Let us, however, turn from the present political complications in the Far East, to consider the splendid work that was done by courageous Anglo-Saxon and Chinese engineers before the invasion.

The Pioneers of Modern Irrigation Schemes

The Dean of Canterbury, Dr. Hewlett Johnson, during his 1934 B.B.C. broadcast talk on his impressions of "A Recent Visit to China," paid a well-deserved tribute to the men who have given their services for the benefit of China's poverty-stricken rural farmers. He mentioned Todd, Hope Simpson, and Findlay Andrews, but the list can be extended to include many other foreigners and Western-trained Chinese engineers. The Dean spoke of them as "men who work side by side with the Chinese in all the dirt and turmoil of their struggling life, who place the authentic stamp of the West on the East. They teach. They also learn, for in the Chinese as friends have vast riches of character, cultivation, and affection to impart. . . . . Todd and his engineers and missionary colleagues take their lives in their hands."

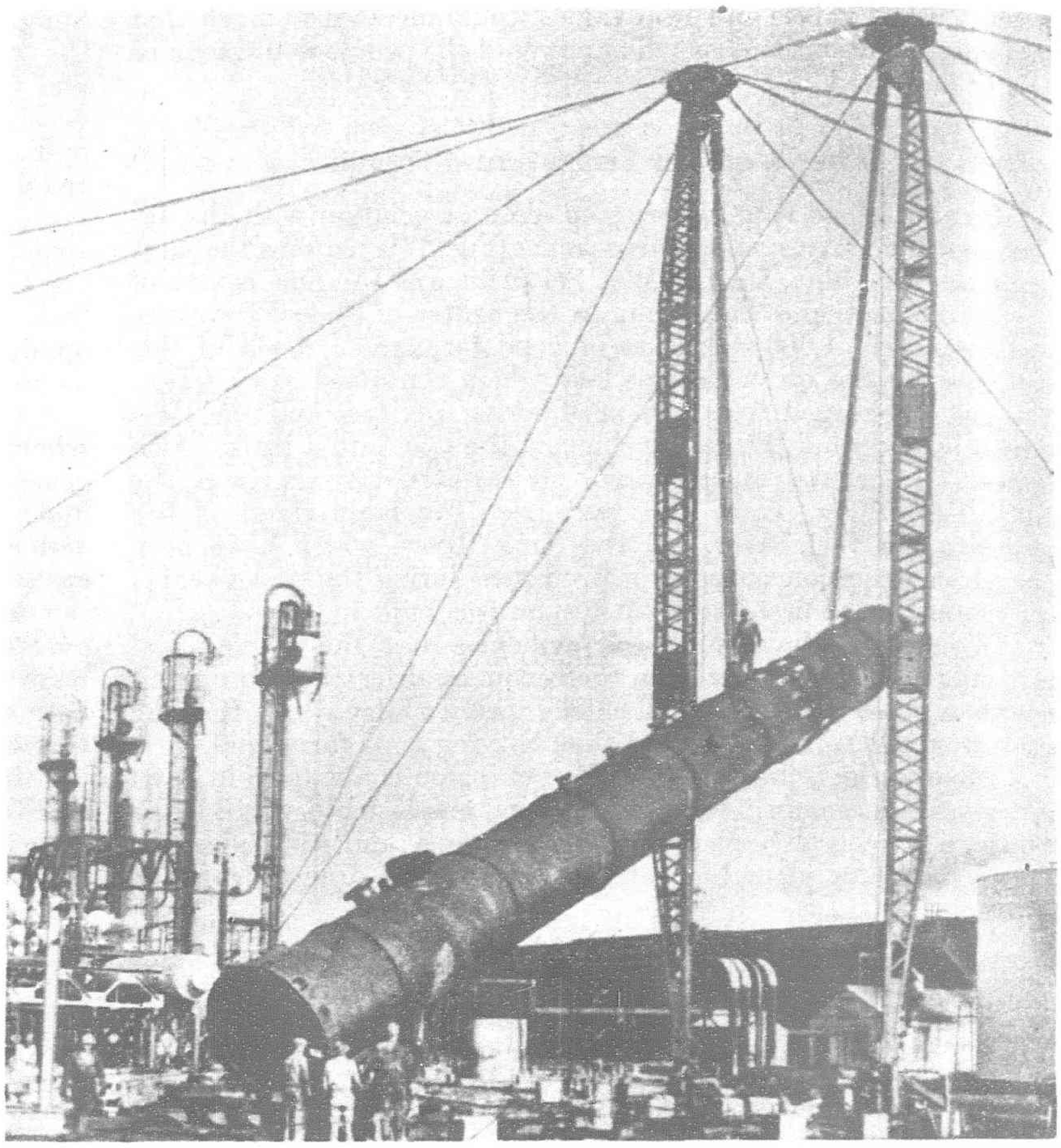
For many years the writer has closely followed the work and the writings of these modern irrigation engineers in China. He acknowledges, with gratitude, that much of the information given above has been gleaned from technical papers read by Todd and his associates before the Association of Chinese and American Engineers in China, and he has also used the C.I.R.F.C. Reports. Very little of the splendid work seems to be known in the British Empire and yet the British were the pioneers of seaborne trade and of engineering work in China.

It is, of course, inevitable that there should be differences of opinion concerning details of plans proposed for large engineering schemes. In China it is essential that local conditions should be closely studied as they are so very different from those that obtain in the industrial countries. It is exasperating to "old residents in China" when perambulating tourists make dogmatic assertions about the people and the country after a superficial glance at local conditions. Expert advice is always valuable, but it is essential for experts to be sure of the facts upon which they base their advice.

In China, as in America, there are conflicting opinions as to the practical advantages to be gained from certain irrigation schemes. But in these days Governments are often obliged to finance large engineering schemes for which private enterprise will not be able to obtain the needed funds. Economic and humanitarian reasons—

(Continued on page 268)

Cracked Gasoline Stabilizer Includes Latest Processes

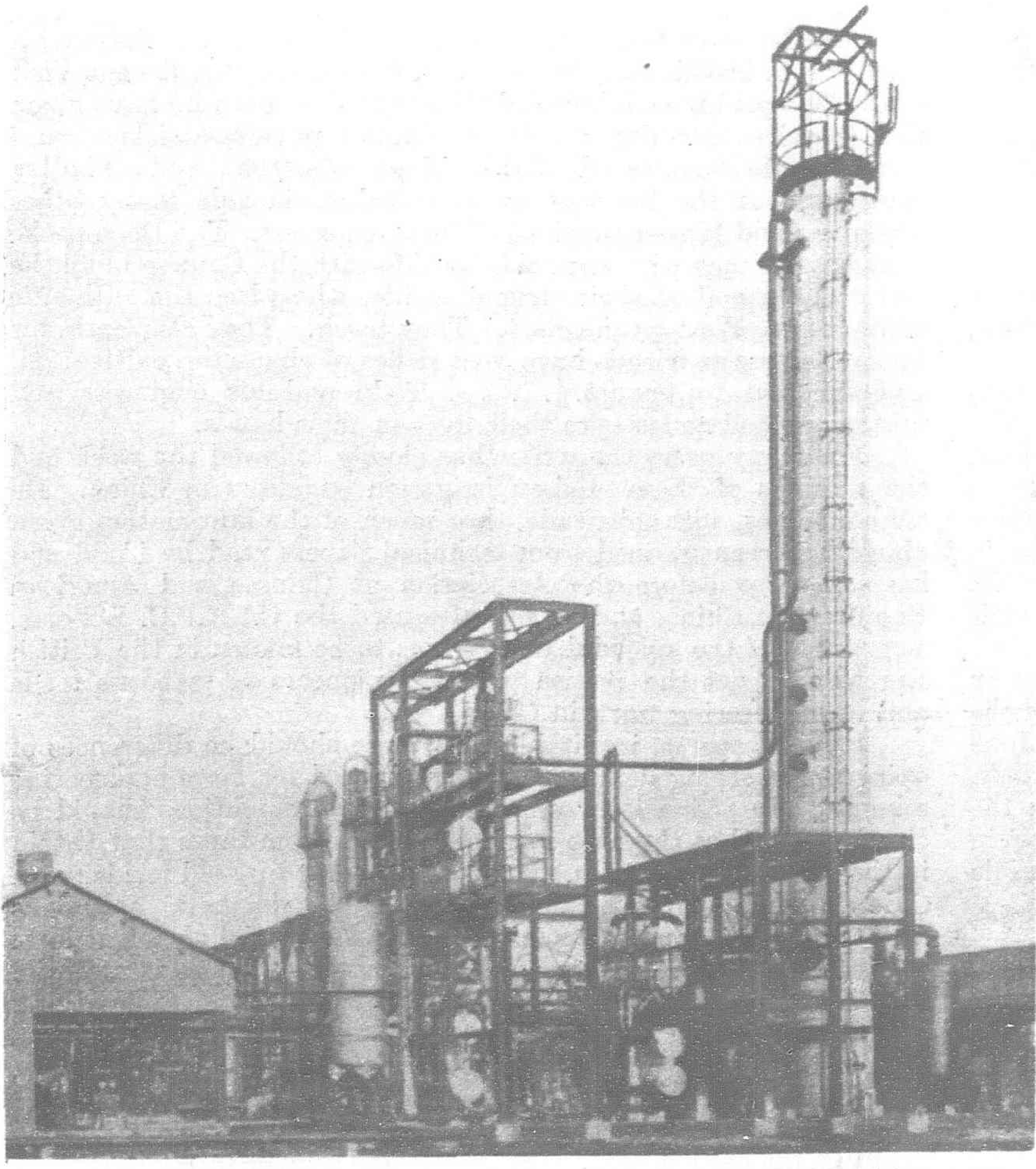


Erection of a 91-foot, 72-ton, stabilizing tower by modern methods which made it possible to design, fabricate, erect and put on steam this 12,500 barrel per day cracked gasoline stabilizing plant within 14 weeks after receipt of "turnkey" contract

Long before the outbreak of the present European conflict, keen international competition and demands for ever-increasing quantities of high octane gasoline for both commercial and military purposes had caused progressive refiners to build toward the newer refining processes. Over two years ago, one of the leading American refiners, in planning a cracked gasoline stabilizer, decided to incorporate equipment that would permit fractionation to a high degree of purity and afford considerable flexibility. With this unit as a basis it would then be feasible to add further equipment to take advantage of some of the anticipated processes that are only now becoming commercially practicable, such as alkylation.

Accordingly, a cracked gasoline stabilizer of 12,500 barrels per day capacity was installed to incorporate close fractionation and flexibility with special provision for future additions. The general arrangement is shown in the accompanying flow diagram.

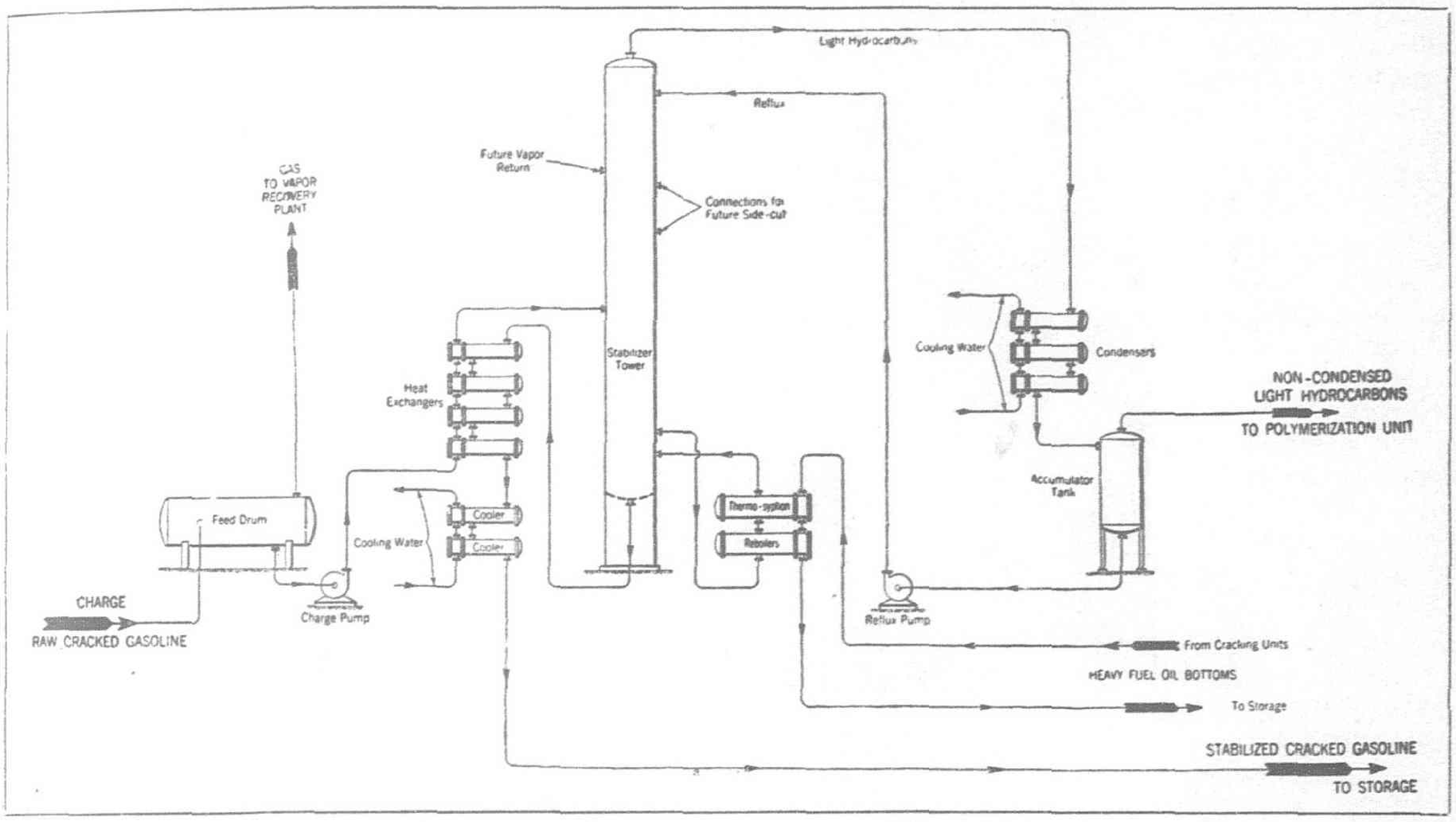
Raw cracked gasoline from a large number of small cracking units, capable of flexible operation, is collected in a feed drum of ample surge capacity in which a positive pressure is maintained to minimize vaporization. Any vapors that are released are vented to a vapor recovery plant. The liquid charge is pumped from the drum through four heat exchangers in series where it is preheated to the desired temperature by the bottoms product leaving the stabilizer tower. The heated charge continues to the tower where it is introduced on any one of three different trays, depending on the type of product required.



General view of cracked gasoline stabilizer showing from left to right, pump house, accumulator tank, condensers and coolers, heat exchanger bank, reboilers, tower and coke settler

Heat for the operation of the column is obtained from two reboilers operating in series. Vapors from them rise through the trays and perform the stripping function in the portion of the tower below the feed inlet. Bubble trays of the adjustable weir type produce the desired fractionation between the cracked gasoline bottoms product, and the propane and lighter hydrocarbons, which are not desired in motor fuel. These latter constituents, together with butane in some operations, are removed overhead and partially condensed in three water-cooled condensers. The entire overhead is collected in an accumulator drum; condensate is segregated and recirculated to the top of the tower as reflex to produce the desired fractionation. The vapors in the accumulator, consisting of the lighter hydrocarbons, are too valuable to be burned as ordinary refinery fuel. Instead they are piped to a low pressure polymerization plant where the unsaturated hydrocarbons are polymerized into polymer gasoline and later blended into motor fuel.

Liquid from the bottom tray is conducted to the bottom of the lower reboiler and flows upward through the two shells. Lighter fractions are vaporized and the vapor-liquid mixture returns to the stabilizer column at a point somewhat below the bottom tray. The liquid fraction consists of stabilized cracked gasoline and is passed from the bottom of the tower through the four above-mentioned heat exchangers where it gives up most of its heat to the incoming charge. Further cooling is accomplished in two shell-and-tube coolers and the finished stabilized gasoline is delivered to storage, ready for blending into motor fuel.



Flow diagram for 12,500 barrel per day cracked gasoline stabilizer using heavy fuel oil bottoms as a heating medium in thermosyphon reboilers

TABLE I. ALTERNATE STABILIZER OPERATIONS

(Based on 12,500 b/d charge of 73.8 A.P.I. gravity)

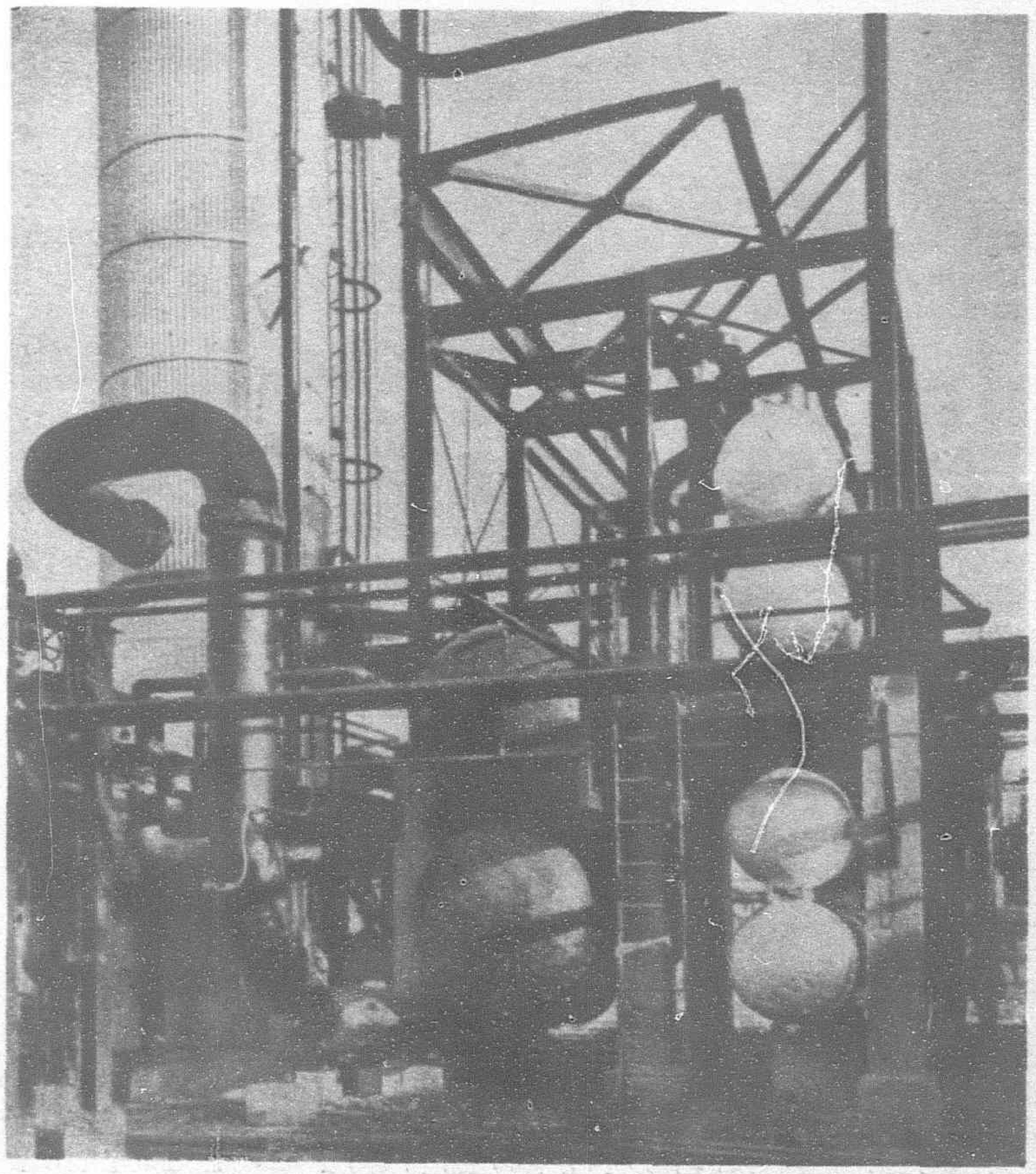
Fractional Analysis	*Case I.*	*Case II.*	*Case III.*
Charge Stock (liquid volume %)			
Methane	0.5		
Ethylene	0.4		
Ethane	3.2		
Propylene	3.4		
Propane	7.8		
Isobutane	2.8		
Butylenes	5.2		
Normal Butane	5.0		
Isopentane	3.9		
Normal Pentane	7.3		
Hexanes and heavier	60.5		
	100.0		
Bottoms Product* (liquid volume %)			
Isobutane	0.0	1.1	3.3
Butylenes	2.3	4.2	6.1
Normal Butane	3.4	5.3	5.9
Isopentane	5.1	4.9	4.6
Normal Pentane	9.6	9.1	8.6
Hexanes and heavier	79.6	75.4	71.5
	100.0	100.0	100.0
Overhead Product (mol %)			
Methane	3.5	4.2	5.2
Ethylene	2.0	2.3	2.8
Ethane	13.7	16.5	20.7
Propylene	15.3	17.0	21.4
Propane	32.8	39.8	49.9
Isobutane	9.9	8.8	—
Butylenes	14.0	8.1	—
Normal Butane	8.8	3.3	—
Isopentane	0.0	0.0	—
	100.0	100.0	100.0

*Finished stabilized cracked gasoline ready for blending into motor gasoline

Certain of the details of this unit are noteworthy. Waste heat, contained in heavy fuel oil bottoms from cracking units, is used as a heating medium in the reboilers instead of expensive materials such as high pressure steam. These bottoms have a gravity of 2.6 degrees A.P.I. Some refiners have experienced considerable difficulty with such a medium due to deposits of coke in the reboiler tubes. In certain instances the trouble was so acute that duplicate reboilers were required in order that one of them could be taken out of service every 24 hours for cleaning. In this unit, however, the trouble has been entirely eliminated by the use of coke settlers and by maintaining a high velocity in the oil as it flows through the reboiler tubes.

The reboilers selected for this service are of the horizontal thermosyphon type, arranged for series flow on both the shell and tube sides. In order to produce satisfactory operation based on purely hydraulic principles, it is always necessary to make a careful analysis of the pressure drops in the connecting piping and in the reboilers. The pressure drop in the hot gasoline, traveling from the lowest tray in the stabilizer tower to the inlet at the bottom of the lower reboiler, must be made low enough to assure positive flow with the available head and, yet, greater than the pressure drop from the bottom inlet through the two reboilers and back to the tower. By designing the thermosyphon system in this manner, a positive circulation through the boilers is assured at all times.

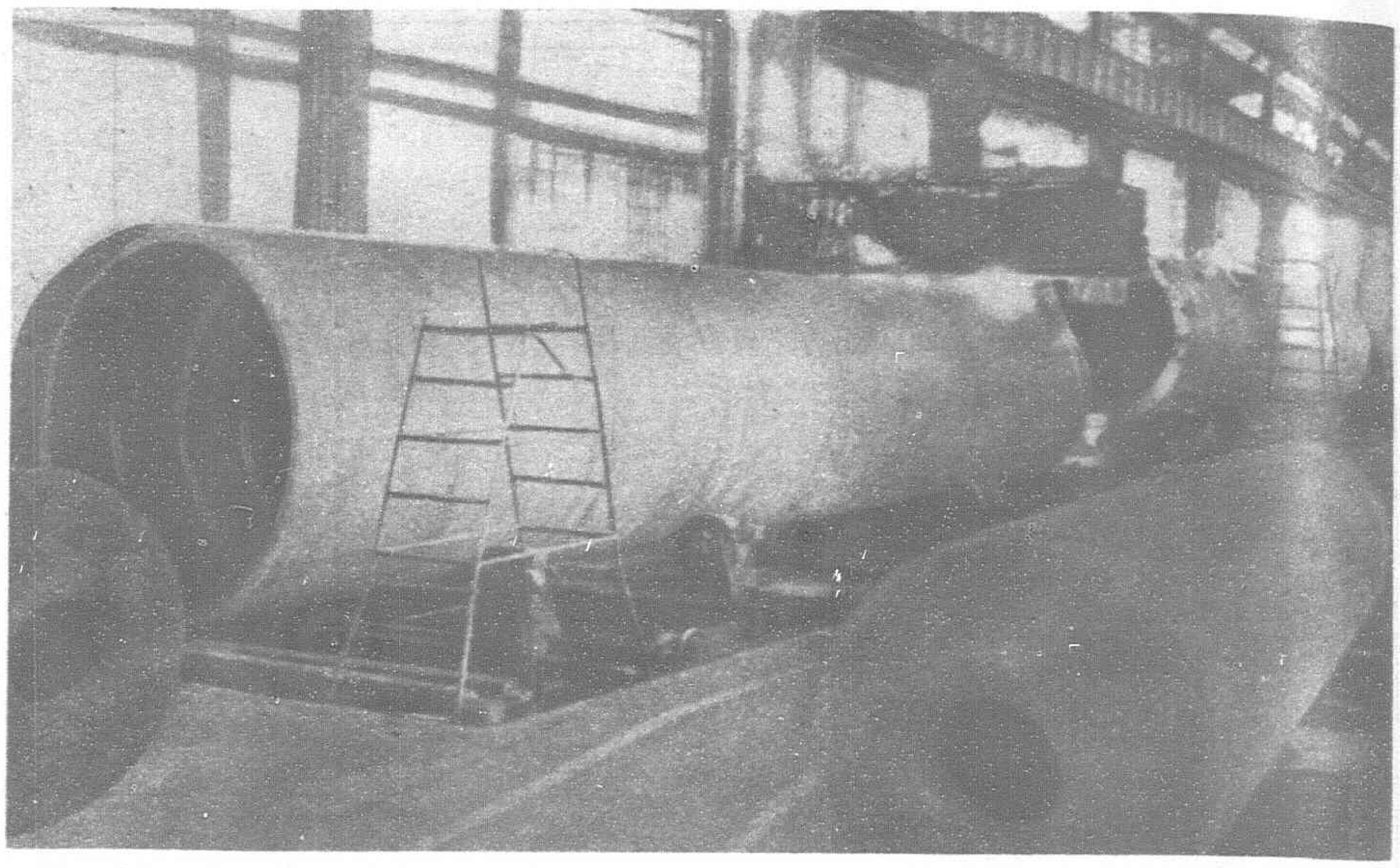
Careful analysis of pressure drops is of vital importance in the operation of thermosyphons and neglect of this factor has been the chief cause of difficulties experienced by some refiners in the



Close-up of stabilizer unit showing base of column at left, jacketed with corrugated sheet iron, two reboilers and four heat exchangers. The thermosyphon connections are clearly shown with the large inlet line at the left leading to the bottom reboiler and the short return line from the top reboiler back to the base of the column past with this type of equipment. A contributing cause also has been improper baffling on the shell sides of the reboilers. If a thermosyphon design is suited to the particular application and these two points are carefully checked, there is no reason to expect anything but highly satisfactory performance from thermosyphon reboilers, as has been fully demonstrated by past experience in similar installations.

In mounting these two horizontal reboilers, one above the other, the problem of relative expansion in the shells and piping due to application of heat, possibly resulting in strains, was met by supporting the upper reboiler directly on the steel framework and hanging the lower unit from the steel.

Provision for future flexibility was made by equipping the original stabilizer column with extra draw-off connections from two trays and a vapor nozzle so that a complete side-cut stripper could be added in case an alkylation unit were later installed. This foresight was entirely warranted since additional fractionation equipment has been added recently to operate in conjunction with a new alkylation unit. The flexibility that is inherent in the stabilizer unit itself is indicated by Table I, showing three alternate operations, all based on a charge of 12,500 barrels per day of 73.8 A.P.I. gravity, raw cracked gasoline.



Shop view showing welding operations on two sections of the stabilizer column. The nearer *section is turning slowly while an automatic welding head applies a girth seam*

Irrigation in China

(Continued from page 265)

for example, famine relief, unemployment—must be taken into account by any efficient Government.

The League of Nations Report

A committee of experts, a few years ago, was sent out to China to report on "Hydraulic and Road Questions in China." The hydraulic section of the report, when published, received very severe criticism (1936) from European and Chinese engineers who had worked in China. Major O. J. Todd had spent fifteen years, Colonel A. M. Shaw had spent four years, S. Eliassen several years, on hydraulic work in China; Hsu Shih-ta, Li Shu-t'ien, Kao Ching-yang are well qualified engineers, who had had considerable experience with hydraulics in their own country and who agreed with the American engineers in their criticism. They wrote: "We find in that Report only irresponsible statements hastily drawn up with neither a proper scrutiny of all the available data nor a complete understanding of the local conditions." Todd and Eliassen wrote that "The visiting investigators who refer to each other and themselves in connection with work in China as 'experts,' must not be permitted to misuse data, belittle the work of other engineers, or make false statements injurious to the profession and to China's future, without being challenged by those whose work they attack as well as by other engineers conversant with the situation." They quote from an article in an authoritative American technical journal, entitled "Taming the Missouri River," which reads: "It is a problem that yields, not to mathematical analyses, but to long years of experience and experiment with the river itself." They then remark that "foreign textbooks can make suggestions, but not dictate practice, in the matter of many problems connected with river control and irrigation in China." Mr. C. C. Chang, acting Chief Engineer, C.I.F.R.C., and Engineer-in-Charge of the Saratsi irrigation project, wrote: "As a Chinese and an engineer connected with the project, I am very sorry to see such mistakes and misleading ideas in the Report. I regret that my Government did not have these experts stay on the ground long enough to ascertain the true facts and recommend practical solutions. We know we are young in engineering science and we hope our foreign friends can improve professional practice among us, but we are disappointed that we have been able to learn so little from these well-known experts."

These published criticisms are of great importance and should convince anyone who has had experience in China that it is essential for visiting experts to obtain the full co-operation of engineers with long experience in the country. However, the League experts have succeeded in stimulating the American and Chinese engineers to publish valuable accounts of their own observation and practice in connection with irrigation; their papers will be of great value when reconstruction begins in China. Meantime we cannot fail to admire the perseverance and ingenuity shown in ancient times by the Chinese in their irrigation works. We must also admire the pluck and ability of engineers in China during this century. No good work is ever wasted. The struggle to improve the standard of life in China will be immensely aided by an extension of irrigation schemes.

Coal Liquefaction in Japan

The first high-grade synthetic gasoline produced in Japan under the Fischer system of coal liquefaction dribbled from an elaborate machine in the Mitsu Synthetic Oil Manufacturing plant in Miike, Fukuoka Prefecture, one afternoon in June.

Completion of the factory and the success of the experiment were highly significant events in the economic life of Japan, since the liquid fuel produced from Kyushu's rich coal fields is said to be sufficiently high in volatility to be used successfully in military aircraft, tanks and submarines as well as automobiles. The Mitsui plant will be capable of producing 1,000 tons of synthetic gasoline a year. With enlargement of the plant, or the construction of new ones, it may be possible for Japan to become self-sufficient in motor fuel, for which it now must depend on the United States, the Netherlands Indies and other countries.

Japan is the only country with the exception of Germany which is able to produce synthetic gasoline under the secret Fischer process. This process is distinctly different for the direct distillation process used by the South Manchuria Railway Company in its coal liquefaction plant at Fushan, permitting the manufacture of a much higher grade of fuel.

The system was developed by Dr. Franz Fischer, a renowned German chemist, and is now in wide use in Germany.

The first test of the Mitsui works at Miike was conducted by a staff of technicians who have devoted years to research in synthetic fuel production.